

AD-A145 523

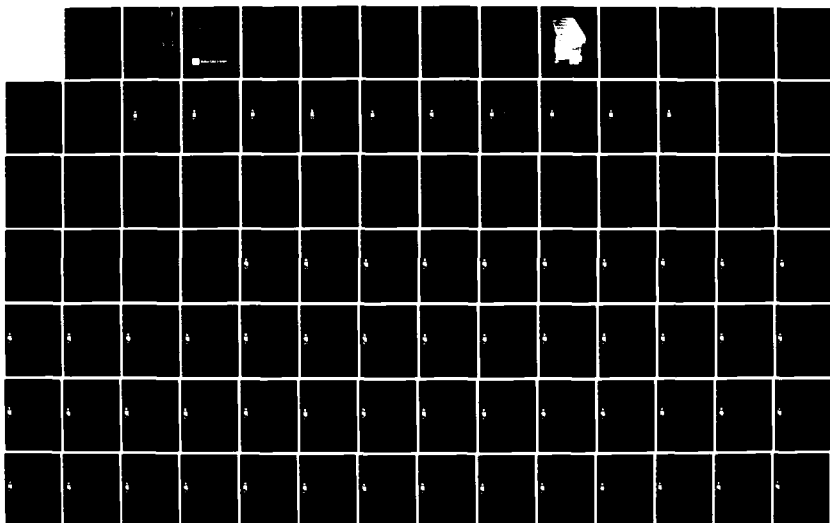
15KW GENERAL PURPOSE POWER CONDITIONER (FREQUENCY
CHANGER)(U) GENERAL MOTORS CORP GOLETA CA DELCO
ELECTRONICS DIV 26 SEP 80 R80-122 DAAK70-77-C-0157

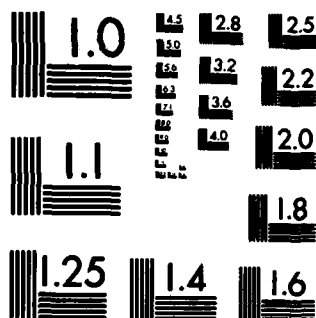
1/3

UNCLASSIFIED

F/G 10/2

NL



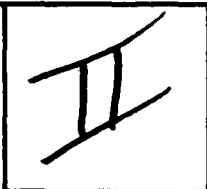


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

PHOTOGRAPH THIS SHEET

AD-A145 523

DTIC ACCESSION NUMBER



LEVEL



INVENTORY

Rpt. No. R80-122, 26 Sep '80
Contract DAAK70-77-C-0157

DOCUMENT IDENTIFICATION

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

DISTRIBUTION STATEMENT

ACCESSION FOR

NTIS GRA&I ☒

DTIC TAB ☐

UNANNOUNCED ☐

JUSTIFICATION

BY Per Ltr. on file

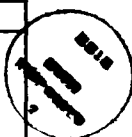
DISTRIBUTION /

AVAILABILITY CODES

DIST

AVAIL AND/OR SPECIAL

A/1



DISTRIBUTION STAMP

DTIC
ELECTE
SEP 10 1984
S D

DATE ACCESSIONED

DATE RETURNED

REGISTERED OR CERTIFIED NO.

84 08 21 135

DATE RECEIVED IN DTIC

PHOTOGRAPH THIS SHEET AND RETURN TO DTIC-DDAC

R80-122

26 SEPTEMBER 1980

AD-A145 523

15kW GENERAL PURPOSE POWER CONDITIONER

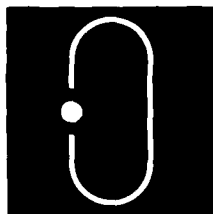
(FREQUENCY CHANGER)

TEST REPORT

CONTRACT DAAK 70-77-C-0157

Prepared for

U.S. Army Mobility Equipment
Research and Development Command
Fort Belvoir, Virginia



Delco Electronics

*General Motors Corporation
- Santa Barbara Operations
Santa Barbara, California*

DISTRIBUTION STATEMENT

Approved for public release;
Distribution Unlimited

R80-122

26 SEPTEMBER 1980

15kW GENERAL PURPOSE POWER CONDITIONER

(FREQUENCY CHANGER)

TEST REPORT

CONTRACT DAAK 70-77-C-0157

Prepared for
**U.S. Army Mobility Equipment
Research and Development Command
Fort Belvoir, Virginia**

Test Initiated: *January 1980*
Test Completed: *March 1980*
Test Engineer: *A.H. Barrett, Delco Electronics*
Witnessed By: *R. Williams, MERADCOM*
Program Manager: *R.F. Brewster, Delco Electronics*

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
I	PURPOSE OF TESTS	1-1
II	DESCRIPTION OF EQUIPMENT	2-1
III	SUMMARY OF TEST DATA	3-1
IV	CONCLUSIONS AND RECOMMENDATIONS	4-1
V	DESCRIPTION OF TESTS	5-1
	5.1 Test Apparatus	5-1
	5.2 Test Procedures	5-1
	5.3 Test Data	5-16
	5.4 Test Photographs	5-93

APPENDIXES

A	ADDITIONAL FREQUENCY CHANGER TESTING	A-1
---	---	-----

SECTION I PURPOSE OF TESTS

The tests described in this report were performed to demonstrate the functional suitability of the test item as specified in the following documents.

- MERADCOM Purchase Description, EED 76022701, for AC-DC Section of 15 kW General Purpose Power Conditioner, dated February 1976
- MERADCOM Purchase Description for Inverter Section of 15 kW General Purpose Power Conditioner, dated October 1976.

The tests performed comply with CLIN0005 and CLIN0006 of Contract DAAK 70-77-C-0157.

1.1 TEST REQUIREMENTS

The tests described herein are intended to indicate the suitability of the 15 kW general purpose frequency changer. Most tests are performed to meet purchase description requirements. Some additional tests felt necessary or desirable by Delco, though not required, were performed.

The contract-required performance tests are listed in Table 1 and are addressed in the text of this report. The areas of additional testing not specifically required are covered in appendixes to this report.

PD NO. A	TEST TITLE B	MIL-STD-705 B TEST METHOD C
(1)	Frequency and Voltage Regulation, Stability (short term) and Transient Response	608.1a
(2)	Voltage Waveform (Oscillographic) (Harmonic Analysis)	601.1c 601.4a
(3)	DC Content	-
(4)	Voltage Modulation	602.1a
(5)	Frequency Modulation	602.1a
(6)	Voltage Dip for Low Power Factor Loads	619.1c
(7)	Voltage Dip and Rise	619.26
(8)	Summation of Losses	-
(9)	Voltage Adjustment Range (i. e., Regulator Range)	511.1c
(10)	Circuit Interrupter (Short Circuit)	512.1c
CLIN0006	Abbreviated Endurance Test	(1,200 h only)

Table 1. Test Requirements

SECTION II DESCRIPTION OF EQUIPMENT

The equipment tested consists of control and power circuitry which constitutes a 15 kW general purpose frequency changer. A photograph of the complete changer is shown in Figure 1. The unit is 29-inches wide, 24-inches high by 30-inches deep and weighs 512 pounds.

Utility class (or better) power 120/208V, 3 phase, 50, 60, or 400 Hz is supplied to an ac-dc converter. Developed under MERADCOM Contract DAAK 70-77-C-0035, dated 12 January 1977, this converter has input current harmonic reduction. Its control circuitry and output filter are specifically designed to make it suitable as an input power source for an inverter which provides 120/208V, 3 phase, 50, 60 or 400 Hz of high quality power. The inverter was developed under MERADCOM Contract DAAK 70-77-C-0157, dated 27 July 1977, which also provided for its integration with the converter to form the deliverable frequency changer package.

A detailed block diagram of the frequency changer which was developed for MERADCOM is shown in Figure 2. The schematic diagram in Figure 3 shows the ac-dc converter power portion of the frequency changer circuitry in its entirety. (The 400 Hz input and the center tap on the inductor (L10) were not used in these tests.) The schematic diagram in Figure 4 shows the inverter power portion of the frequency changer circuitry in its entirety.

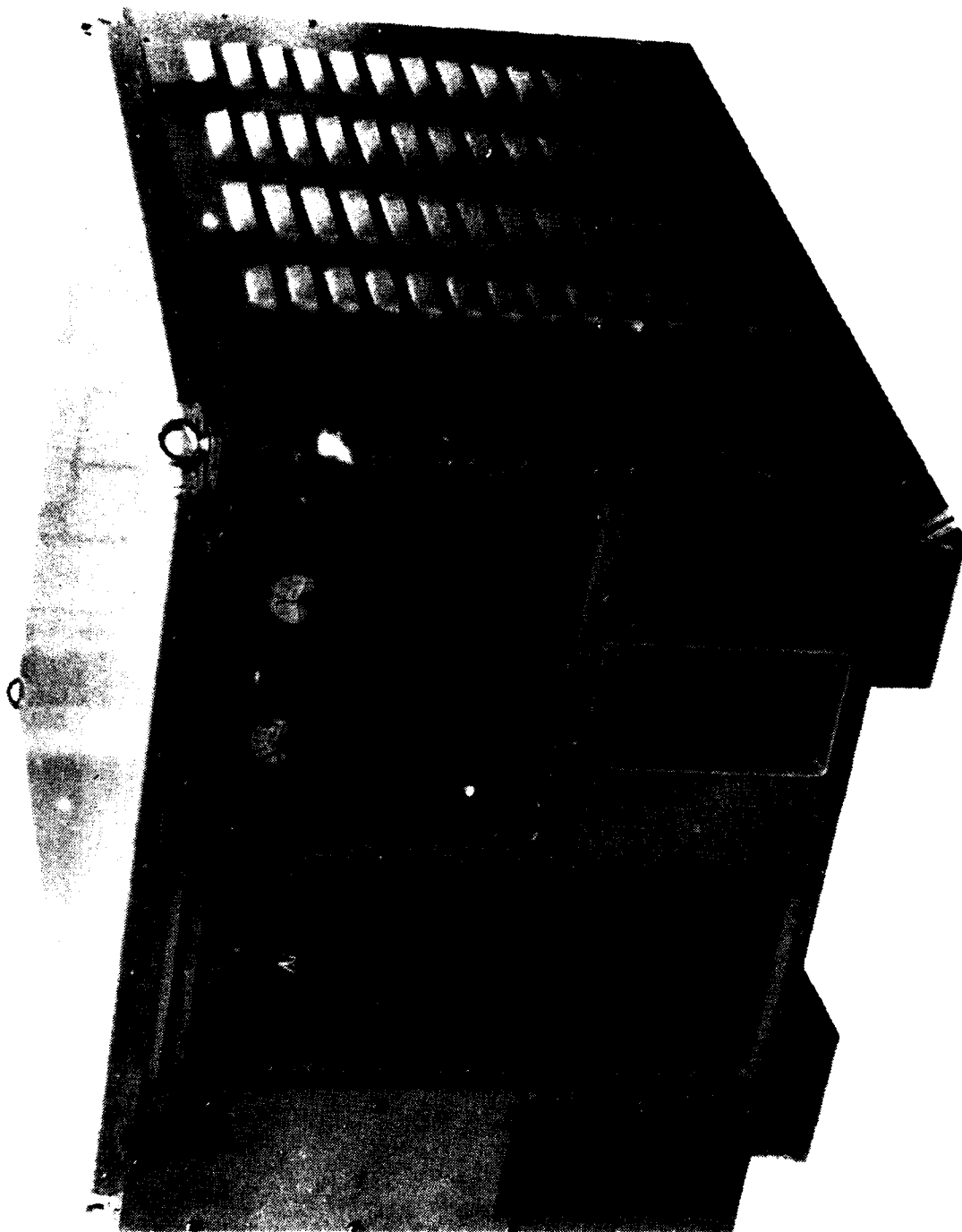


Figure 1. Frequency Changer

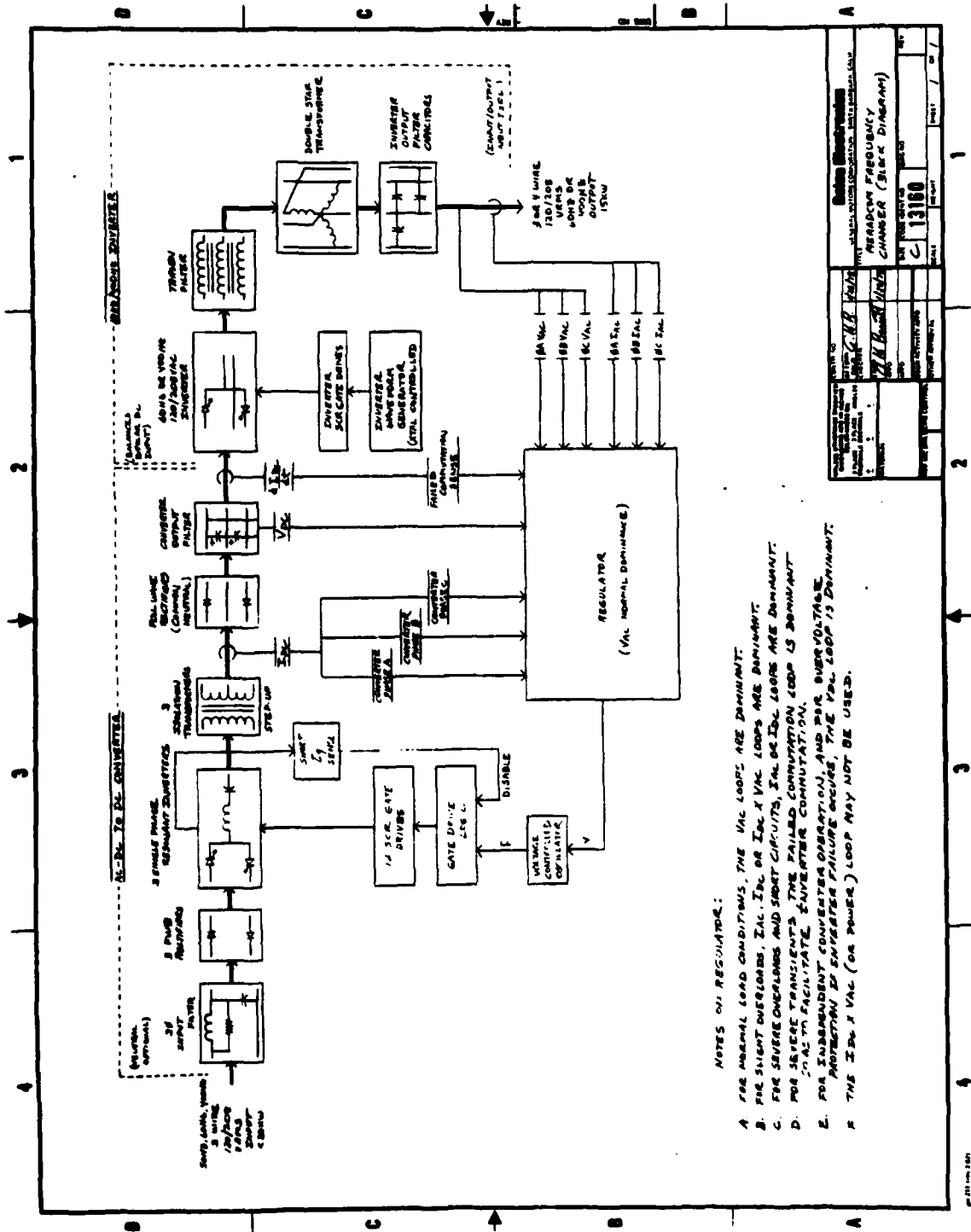


Figure 2. Frequency Changer Functional Block Diagram

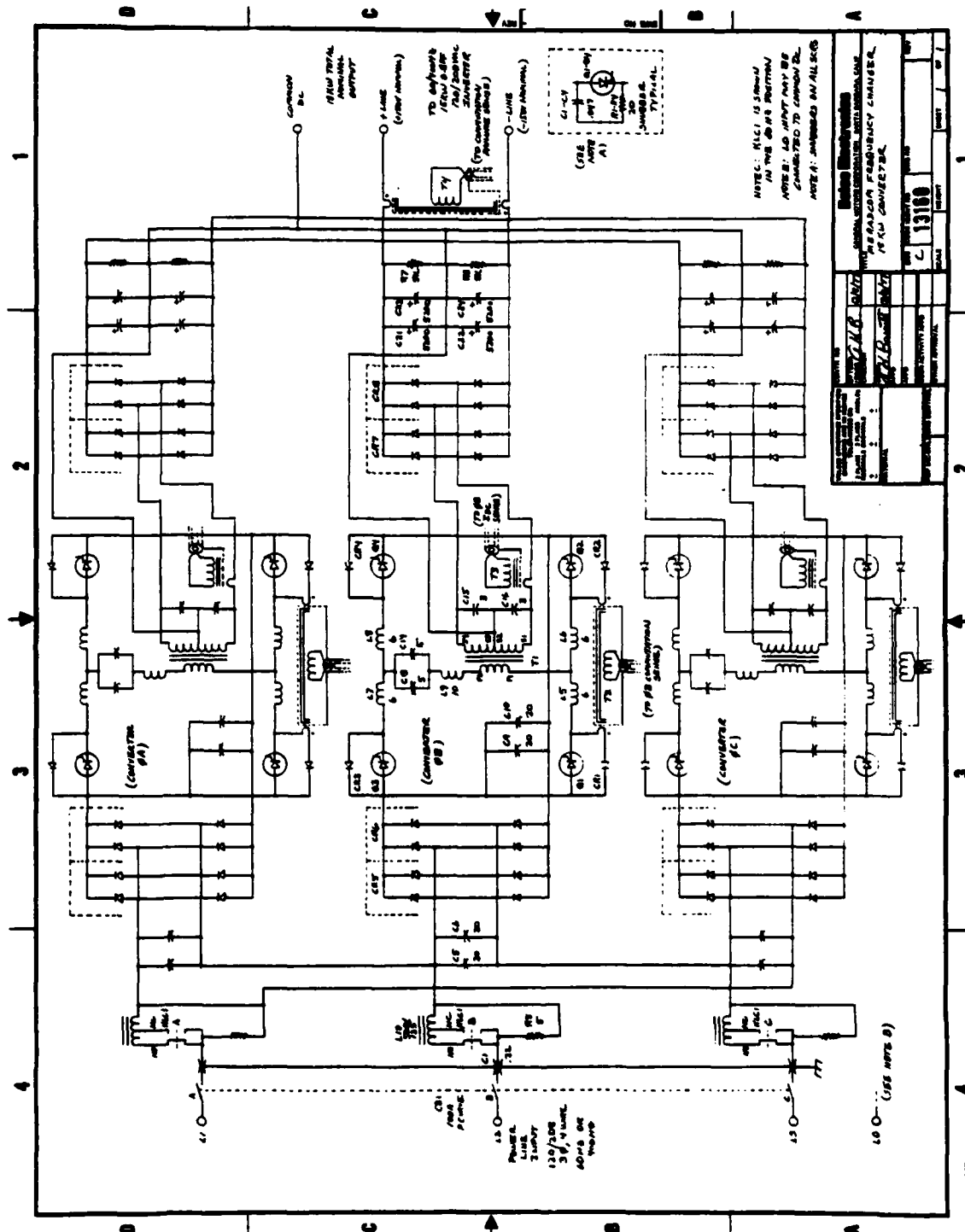


Figure 3. AC-DC Converter for the General Purpose Frequency Changer

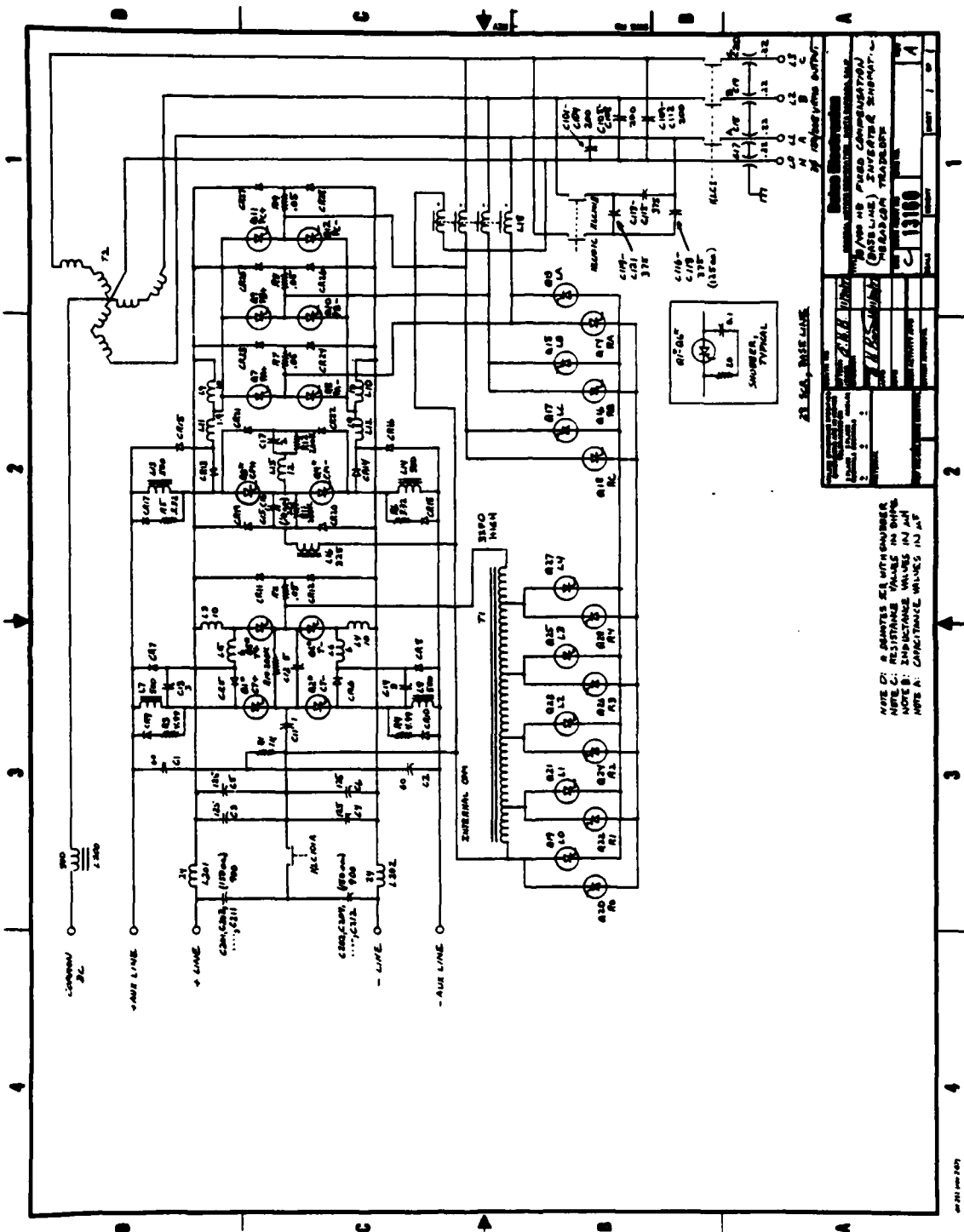


Figure 4. Inverter for the General Purpose Frequency Changer

SECTION III SUMMARY OF TEST DATA

3.1 SUMMARY

The results of the frequency changer electrical performance and endurance tests are summarized in Tables 2 and 3. For some performance characteristics, specifications are not provided explicitly in the purchase descriptions referenced in Section I; and comparison with MIL-STD-1332 Precise or Utility Classes of power is suggested. For a few characteristics there are no specifications at all, and results are simply tabulated and called adequate.

Regulation, losses, efficiencies, and THD are plotted against frequency changer output load in Figures 5 through 14. The recent test data is identical to that previously reported in Delco Electronics Test Report R78-28, and the same summary data applies.

The 1,200-hour endurance test was free of reportable failures. Table 3 summarizes the test load profile used.

INPUT CHARACTERISTIC PARAMETER		MIL-STD-1332 PRECISE (CLASS 1)	MIL-STD-1332 UTILITY (CLASS 2)	PURCHASE DESCRIPTION	MEASURED PERFORMANCE	COMMENTS (OTHER)		
1)	Frequency Changer Input Voltage	N/A	N/A	120/208V +10%, -15%	120/208V +10%, -15%	Complies		
2)	Frequency Changer Input Frequency	N/A	N/A	50, 60, 400 Hz	60 Hz. was tested	Not limited		
3)	THD	N/A	N/A	5% over normal load range	5.8% at RL only	Limited (See Note A)		
	Worst Single Harmonic	N/A	N/A	2% over normal load range	4.2%, 7th harmonic, RL only	Limited (See Note A)		
	Deviation Factor	N/A	N/A	5% over normal load range	Not tested	See Note A		
	Peak inrush on application of rated load from no load	N/A	N/A	Not specified	100% of rated load input current <125ms rec. time	Adequate, not specify		
4)	Frequency Changer Input Power Factor (60 Hz input frequency)	N/A	N/A	Not specified	Unity (<5° leading)	Adequate, not specify		
5)	Converter Output Format (same as Inverter Input)	N/A	N/A	±150 Vdc, 60A (nom. at RL)	±150 Vdc, 60A (nom. at RL)	Complies		
6)	Voltage Regulation	60 Hz 400 Hz	1% 1%	1.5% 1.5%	<0.5% <0.5%	Complies		
7)	Steady State Stability	Short term (30 sec)	60 Hz 400 Hz	1% 1%	<0.5% <0.5%	Complies		
	Long term (4 hrs)	60 Hz 400 Hz	2% 2%	1% 1%	<0.5% <0.5%	Complies		
	Application of rated load, dip	60 Hz 400 Hz	15% / 0.3 sec 12% / 0.5 sec	20% / 3 sec N/A	20% / 2 sec 20% / 2 sec	13.7% / 250 ms 12.3% / 250 ms	Complies	
8)	Transient Performance	Rejection of rated load, rise	60 Hz 400 Hz	15% / 0.5 sec 12% / 0.5 sec	20% / 3 sec N/A	20% / 2 sec 20% / 2 sec	14.3% / 250 ms 15.0% / 250 ms	Complies
	Dip for low power factor load	60 Hz 400 Hz	30% / 0.7 sec 25% / 0.7 sec	40% / 5 sec N/A	40% / 5 sec 40% / 5 sec	1.3% / 100 ms 78A, -5 PF Not measured	Complies	
	Total Harmonic Distortion	60 Hz 400 Hz	5% 5%	5% N/A	5% 5%	2.41% 2.44%	Complies	
9)	Waveform	Max Individual Harmonic	60 Hz 400 Hz	2% 2%	2% N/A	2% 2%	1.3% / 5th 2.0% / 5th	Complies
	Deviation Factor	60 Hz 400 Hz	5% 3%	5% N/A	5% 5%	<5% <5%	Complies	
	Voltage Modulation (or ripple)	60 Hz 400 Hz	- -	- N/A	3V pk-pk (L-N) 3V pk-pk (L-N)	None None	Complies	
	Voltage Unbalance with Unbalanced Load	60 Hz 400 Hz	5% 5%	5% N/A	5% 5%	1.5% <3.0%	Complies	
11)	Phase Balance Voltage	60 Hz 400 Hz	1% 1%	1% N/A	Not specified Not specified	<1% <1%	Complies - 1332 Prec	
12)	Voltage Adjustment Range	60 Hz 400 Hz	-5, +15% -5, +10%	-5, +15% N/A	+5% +5%	Not tested Not tested	Not limited (should be)	
13)	Short Circuit Current	60 Hz 400 Hz	- -	- N/A	2 PU rated 2 PU rated	2.0 PU 2.0 PU	Control pr	
14)	All Output Frequency Parameters	60 Hz 400 Hz	- -	- N/A	60 Hz 400 Hz	59.998 Hz 599.99 Hz	Crystal re	
15)	Phase Angle Balance	60 Hz 400 Hz	- -	- N/A	Not specified Not specified	<1 degree <1 degree	Adequate, not specify	
16)	Frequency Changer No Load Losses	60 Hz 400 Hz	N/A N/A	N/A N/A	500 watts 500 watts	1950 watts 2715 watts	Does not	
17)	Frequency Changer Efficiency at Full Load (1.0 PF)	60 Hz 400 Hz	N/A N/A	N/A N/A	80% 80%	77% 73.3%	Does not	
18)	Frequency Changer Efficiency at Rated Load (0.8 PF)	60 Hz 400 Hz	N/A N/A	N/A N/A	80% 80%	80.0% 75.8%	Does not	

NOTES:

- A. THD with the frequency changer delivering rated load at 60 Hz or 400 Hz is approximately 6% - 1 harmonic content is referenced to the corresponding d.c. rated input current THD is nearly the same at lower loads - approximately 6% at no load. The worst single harmonic increases likewise - to approximately 6% at no load.
- B. Regulator instability, which can be corrected, was noted.

THE

L. W. 18 03-1, C.

THE

Table 2. Comparison of 4500-Hz and 1000-Hz Hearing with

EQUIP FREQUENCY CHANGER

MFR DELCO

MODEL NO. _____

SERIAL NO. _____

REF: MIL-STD-7058 608.1a



SANTA BARBARA, CALIFORNIA

TEST NO. _____

DATE FEB. 3, 1978

BY A. H. BARRETT

TEST REC OUTPUT VOLTAGE

REGULATION NL → RL

1 NL → FL

60 Hz

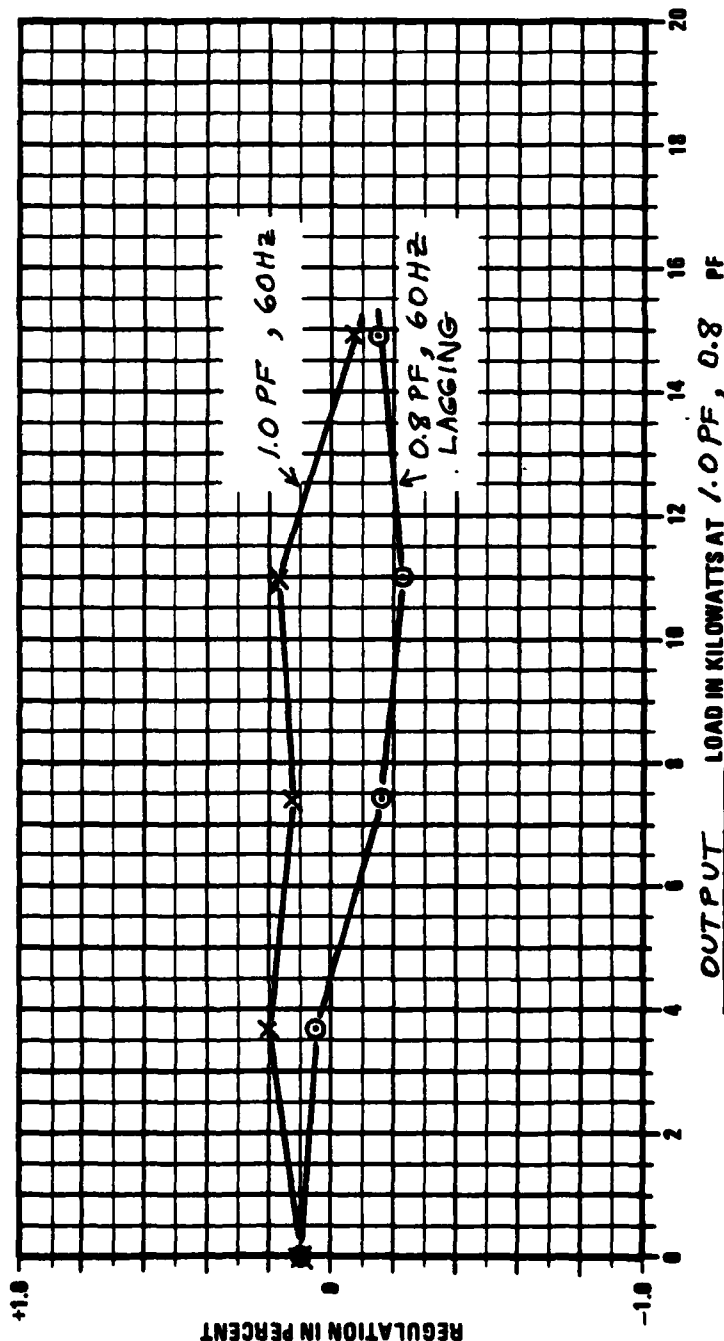


Figure 5. Output Voltage Regulation, 60 Hz

R80-122

<u>EDWP FREQUENCY CHANGER</u>		<u>TEST REC OUTPUT VOLTAGE</u>	
<u>MFR DELCO</u>		<u>REGULATION NL → RL</u>	
<u>MODEL NO.</u>	<u>TEST NO.</u>	<u>φ NL → FL</u>	
<u>SERIAL NO.</u>	<u>DATE FEB. 3, 1978</u>	<u>400 Hz</u>	
<u>REF: MIL-STD-705B 608.1a</u>	<u>BY A.H. BARRETT</u>		



SANTA BARBARA, CALIFORNIA

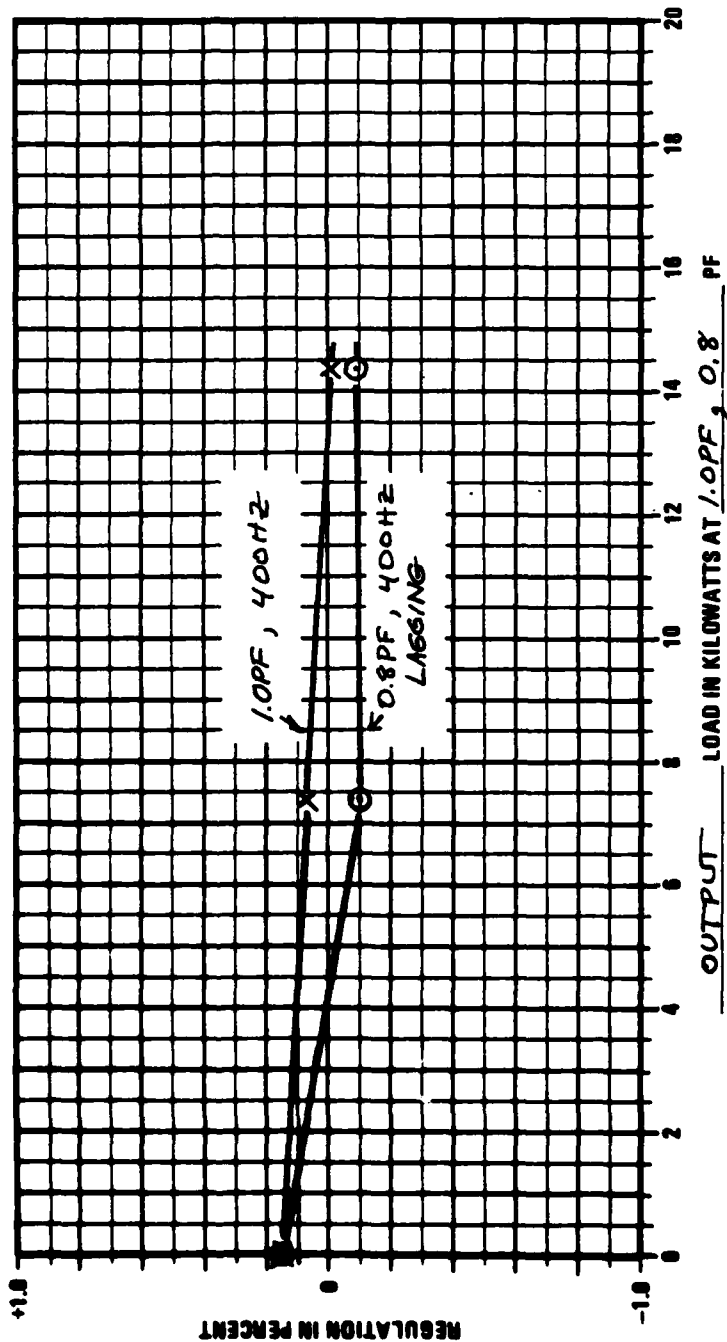


Figure 6. Output Voltage Regulation, 400 Hz

EQUIP FREQUENCY CHANGER
 MFR DELCO
 MODEL NO. _____
 SERIAL NO. _____
 REF: MIL-STD-705B

TEST REC FREQUENCY
CHANGER LOSSES
(EXCLUDING LOW LEVEL)
 VS LOAD
60Hz OUTPUT

TEST NO. _____
 DATE FEB. 3, 1978
 BY A.H. BARRETT



SANTA BARBARA, CALIFORNIA

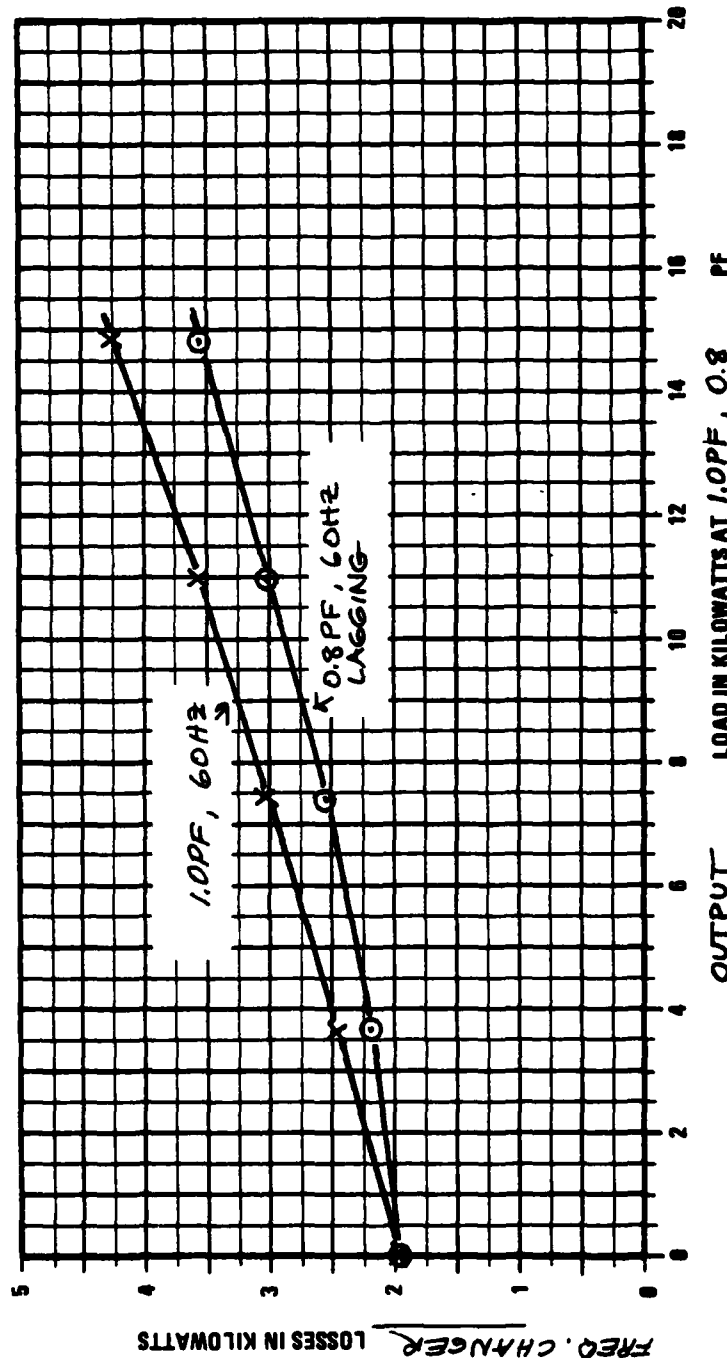


Figure 7. Frequency Changer Losses, 60 Hz Output

EQUIP FREQUENCY CHANGER
 MFR DELCO
 MODEL NO. _____
 SERIAL NO. _____
 REF: MIL-STD-705B
 TEST NO. _____
 DATE FEB. 3, 1978
 BY A.H. BARRETT
 TEST REC FREQUENCY
CHANGER LOSSES
(EXCLUDING LOW LEVEL)
VS LOAD
400 HZ OUTPUT

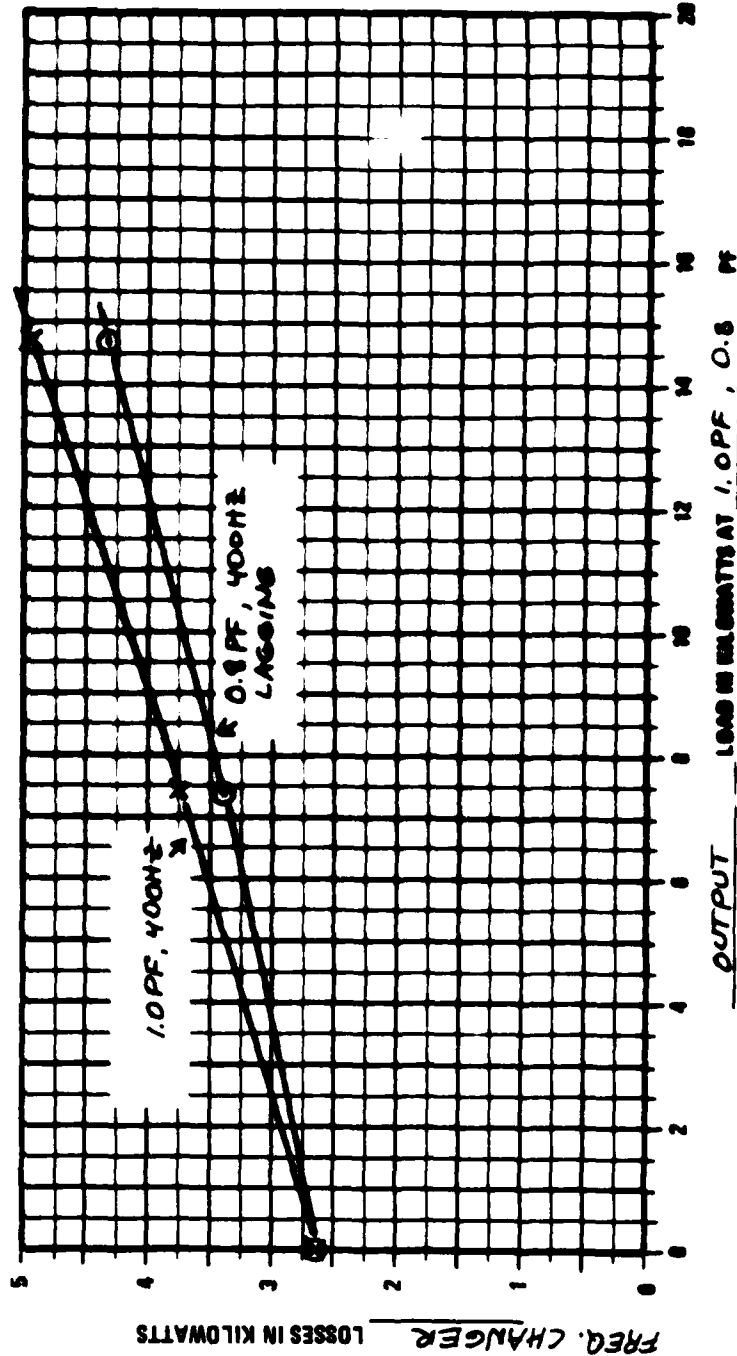


Figure 8. Frequency Changer Losses, 400 Hz Output

EQUIP FREQUENCY CHANGER

MFR DELCO

MODEL NO. _____

SERIAL NO. _____

REF: MIL-STD-705B



SANTA BARBARA, CALIFORNIA

TEST NO. _____

DATE FEB. 3, 1978

BY A.H. BARRETT

TEST REC. CONVERTER

LOSSES, INVERTER

LOSSES VS FREQUENCY

CHANGER LOAD

60 HZ OUTPUT

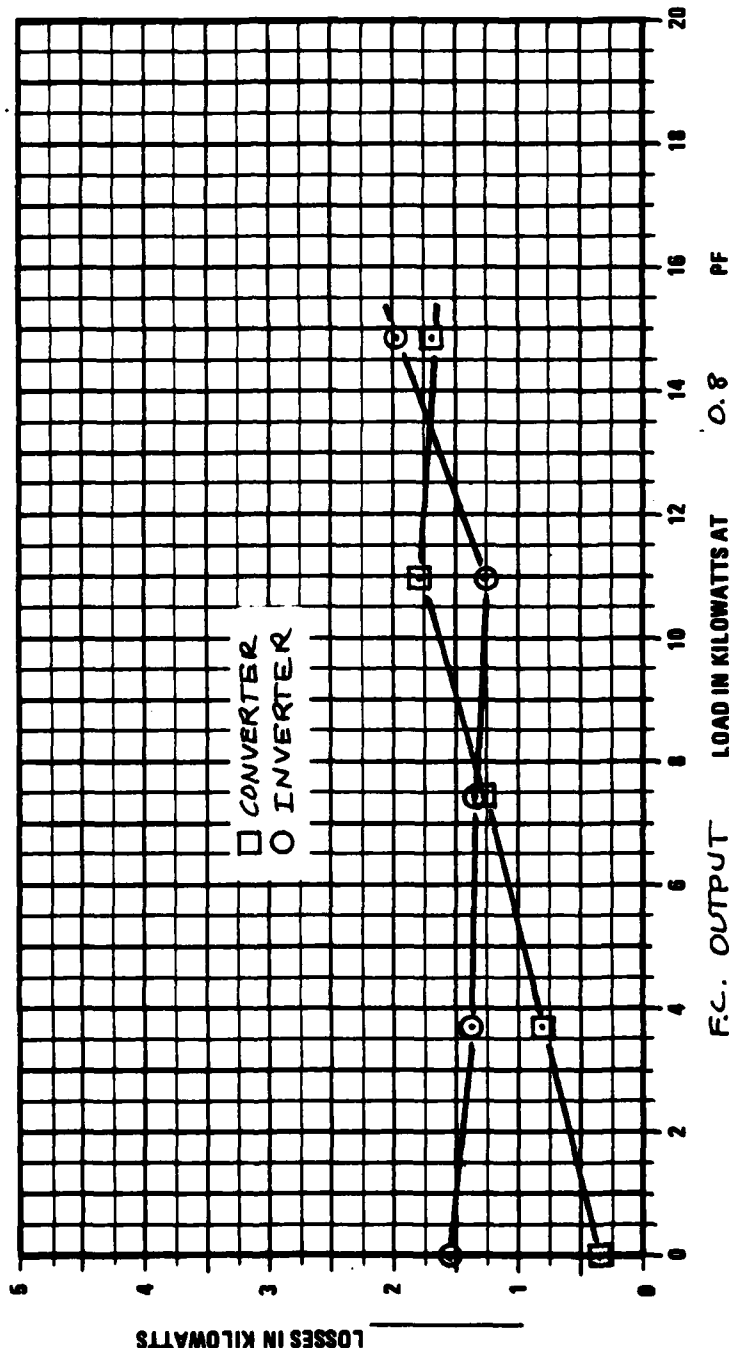




Figure 9. Converter/Inverter Losses vs Load, 60 Hz Output

R80-122

EQUIP FREQUENCY CHANGER
 MFGR DELCO
 MODEL NO. _____
 SERIAL NO. _____
 REF: MIL-STD-705B

TEST REC CONVERTER
LOSSES, INVERTER
LOSSES VS FREQUENCY
CHANGER LOAD
400 HZ OUTPUT

TEST NO. _____
 DATE FEB. 3, 1978
 BY A.H. BARRETT

 
 SANTA BARBARA, CALIFORNIA

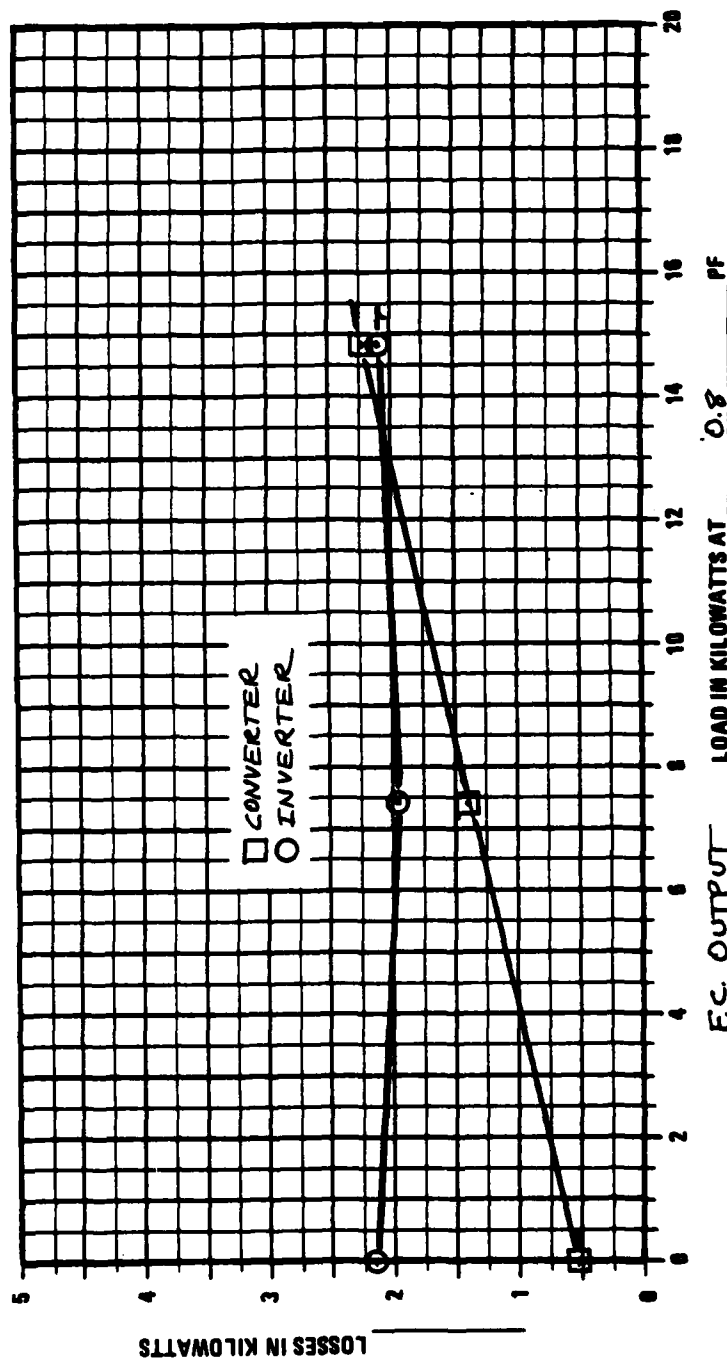


Figure 10. Converter/Inverter Losses vs Load, 400 Hz Output

TEST REC. CONVERTER,
INVERTER & FREQ.
CHANGER EFFICIENCY
VS P.C. LOAD
60 HZ OUTPUT



SANTA BARBARA, CALIFORNIA

EQUIP FREQUENCY CHANGER
MFR DELCO
MODEL NO. _____
SERIAL NO. _____
REF: MIL-STD-705B

TEST NO. _____
DATE FEB. 3, 1978
BY A.H. BARRETT

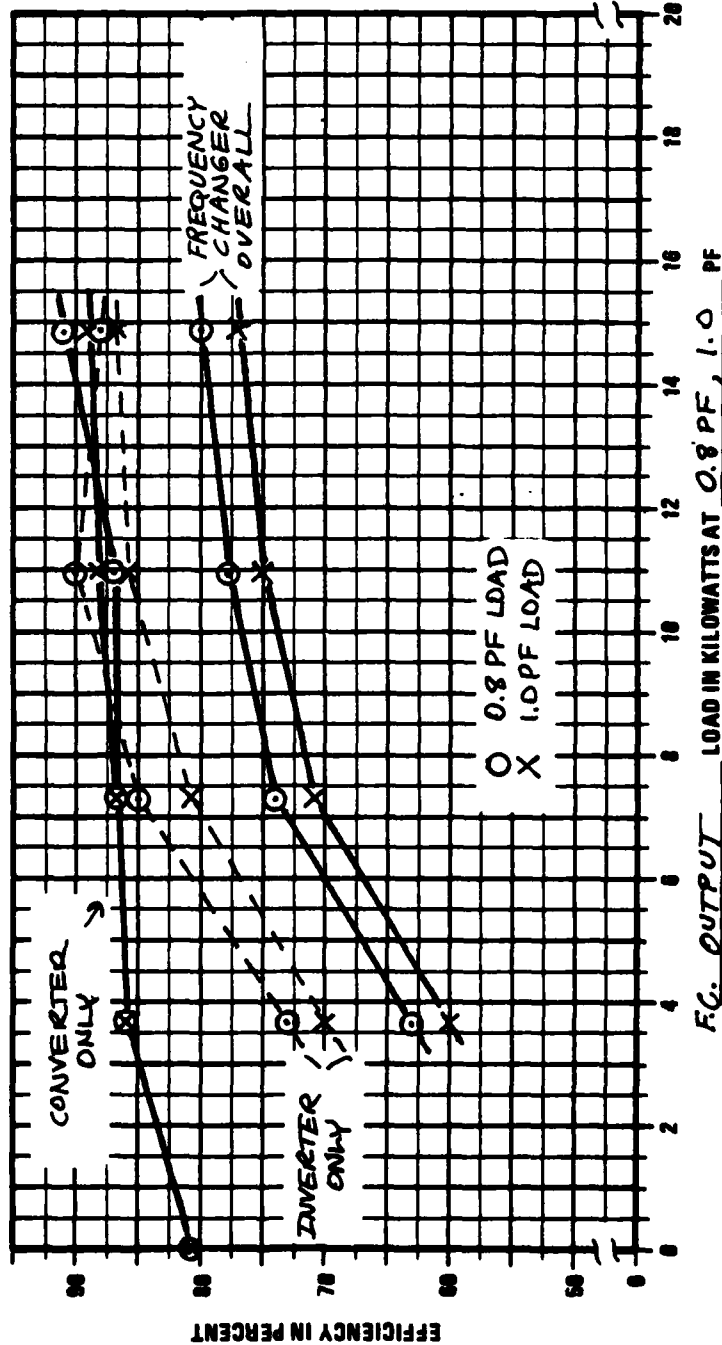




Figure 11. Converter/Inverter and Frequency Changer Efficiency, 60 Hz Output

EQUIP FREQUENCY CHANGER
 MFGR DELCO
 MODEL NO. _____
 SERIAL NO. _____
 REF: MIL-STD-705B

TEST REC CONVERTER,
INVERTER & FREQ.
CHANGER EFFICIENCY
 VS F.C. LOAD
400 HZ OUTPUT

TEST NO. _____
 DATE FEB. 3, 1978
 BY A.H. BARRETT

  SANTA BARBARA, CALIFORNIA

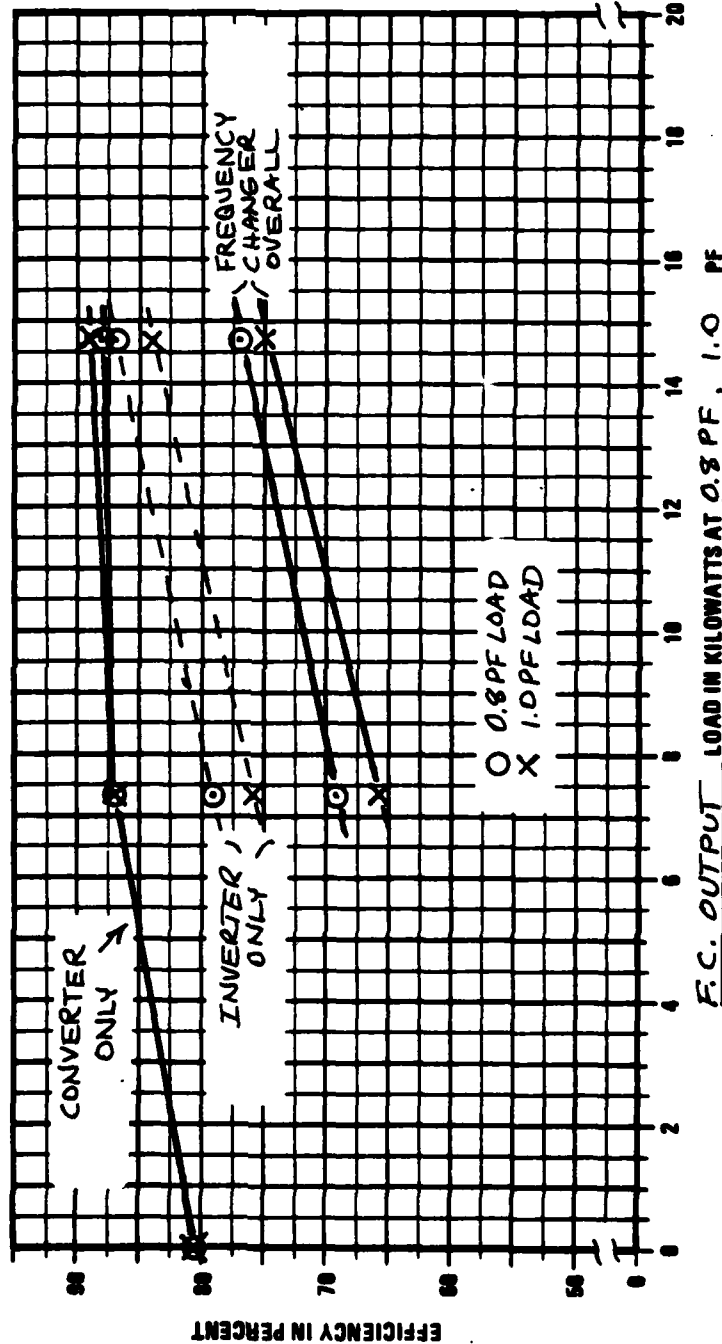


Figure 12. Converter/Inverter and Frequency Changer Efficiency, 400 Hz Output

TEST REC TOTAL
HARMONIC DISTORTION
 VS FREQUENCY
CHANGER LOAD
60 HZ OUTPUT



SANTA BARBARA, CALIFORNIA

TEST NO. _____
 DATE FEB. 3, 1978
 BY A.H. BARRETT

EQUIP FREQUENCY CHANGER
 MFGR DELCO
 MODEL NO. _____
 SERIAL NO. _____
 REF: MIL-STD-705B 601.4a

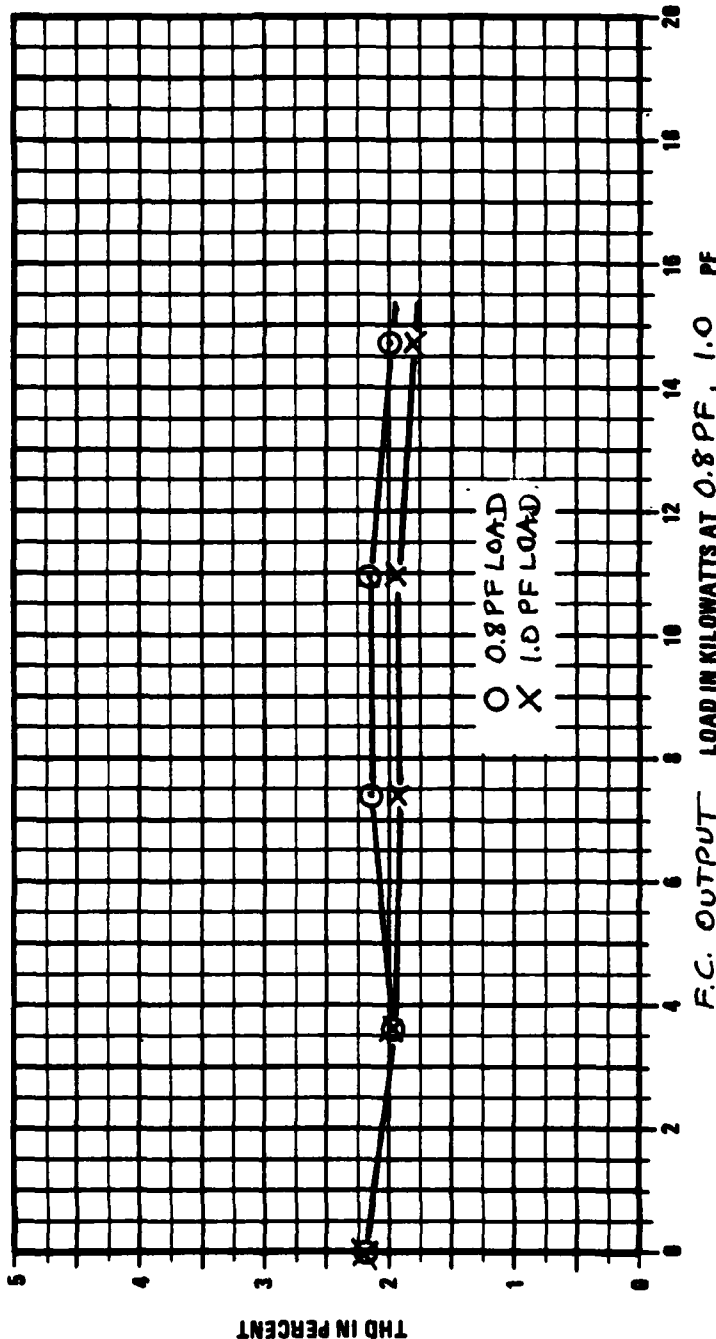


Figure 13. Total Harmonic Distortion versus Load, 60 Hz Output

EQUIP FREQUENCY CHANGER
 MFR DELCO
 MODEL NO. _____
 SERIAL NO. _____
 REF: MIL-STD-705B 601.4a

TEST REC TOTAL
HARMONIC DISTORTION
VS FREQUENCY
CHANGER LOAD
400HZ OUTPUT

TEST NO. _____
 DATE FEB. 3, 1978
 BY A. H. BARRETT

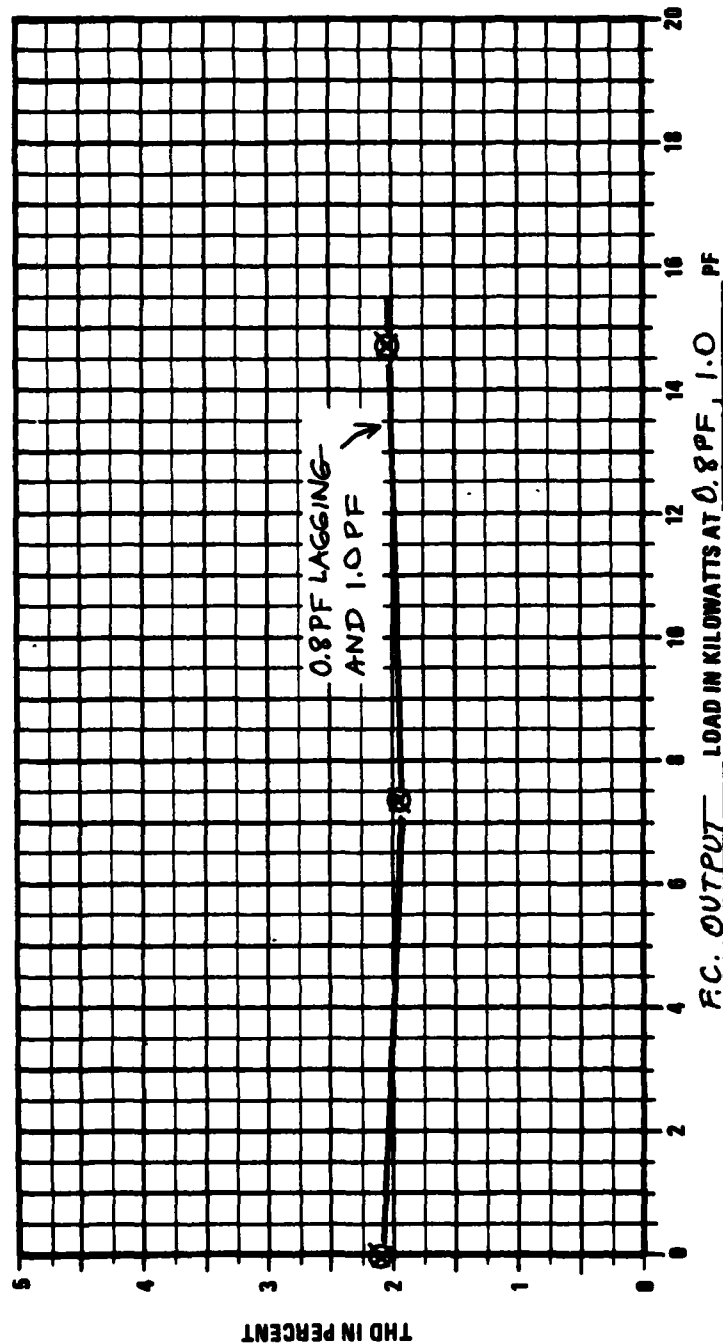


Figure 14. Total Harmonic Distortion versus Load, 400 Hz Output

<u>LOAD</u>	<u>OUTPUT FREQUENCY</u>	
	<u>60 Hz</u>	<u>400 Hz</u>
NL to \leq 0.25 PU	68 h	1 h
>0.25 PU to \leq 0.5 PU	300.5 h	143 h
>0.5 PU to \leq 0.75 PU	185 h	224 h
>0.75 PU to \leq 1.0 PU	169.5 h	111 h

Total Time 1,202 hours (no failures)

NOTE: PU indicates per unit rated load. Testing was done at 0.8 power factor lagging and unity power factor loading.

Table 3. Endurance Test Loads

SECTION IV

CONCLUSIONS AND RECOMMENDATIONS

Most test results are better than, or at least compliant with, PD or other requirements. There are deviations, measured or suspected, which are discussed herein.

4.1 PARAMETER 2 — FREQUENCY CHANGER INPUT FREQUENCY AND PARAMETER 3 — INPUT CURRENT

The set was tested only with 60 Hz input power because adequate 50 Hz and 400 Hz power sources are not available at Delco. There is no design limitation which precludes operation at 50 Hz and 400 Hz. It is quite possible that the present converter input filter would not function as is at 400 Hz, but the inductor tap scheme shown in Figure 3 probably would.

Deviation from the ideal sinusoidal input current is above that specified in the PD. Distortion components are considerably above those measured on a breadboard frequency changer and reported in Delco Electronics Test Report R78-28. For example, at rated load, input current THD was reported as 3.5 percent. It is now reported as 5.8 percent.

The reasons for the degradation in performance should be evaluated. It is believed that the staggered firing pattern of the A, B, and C phase converter SCR's, as opposed to the simultaneous firing pattern formerly used, is the main contributor to the degradation. Addition of a logic power supply in the system may also be a contributing factor.

An amendment to the PD specification should be made if necessary after simultaneous firing has again been tried and analyzed.

4.2 PARAMETER 13 — SHORT CIRCUIT CURRENT

Testing of single, two, and three-phase short circuits (from RL) was done only at 60 Hz output frequency. Earlier testing indicated similar results at 400 Hz output frequency. The inverter portion always seems to function well, but a problem exists in the converter control.

As previously reported, there is still an instability in the low level control circuit for the converter. This results in bursts of output approximately 0.5-second long spaced by "no output" periods of approximately 0.25 second. However, a balanced three-phase short circuit does not cause control instability, and approximately 110A rms per phase was recorded. It has been concluded that accurate and instantaneous monitoring of inverter input current is required for proper short circuit control. This circuit augmentation should be made to the set.

4.3 PARAMETER 16 - NO LOAD LOSSES, PARAMETER 17 - EFFICIENCY AT FULL LOAD, PARAMETER 18 - EFFICIENCY AT RATED LOAD

The purchase description (Ref Section I) states that the no load loss shall not exceed 500 watts and that efficiency with the set operating above 25 percent of rated power shall be 80 percent minimum. No-load losses are well in excess of those specified and, in the fully packaged frequency changes, they are 2.8 kW. The rated load efficiency is 80 percent at 60 Hz output and 76 percent at 400 Hz output.

4.4 RECOMMENDATIONS

Harmonic distortion of the input currents to the frequency changer is very low, although it is greater in some cases than that specified. The input filter for the converter certainly can be improved upon. More should be learned about the effects of source impedance on input current harmonics. It is recommended that Delco refine the input filter while studying source impedance effects. MERADCOM should consider changing the current harmonic specifications. It is recommended that Navy specifications for frequency changers, from the NAVSEC offices, be reviewed.

Delco should further refine the low level control circuits so as to eliminate instabilities that have been shown to occur with heavy unbalanced loads and short circuits.

It was observed during severe overload testing that in addition to output current limiting problems, there were power limiting problems. The frequency changer has no control input to provide constant power into an overload. It is strongly recommended that a constant power limit mode of operation be added.

At 821 hours into the endurance test, a brownout occurred on the 60 Hz input to the frequency changer. The brownout was properly sensed as undervoltage (7 cycles at 80 V), and the set was shut down. A brownout at 1,172 hours caused a second shutdown. The question of what action the set should take in the event of a brownout needs to be answered.

Rather high no-load and light-load losses are related to the specific inverter approach used. The two major contributions are from the following:

- Load-independent, high level, forced commutation circuits
- A very large, fixed, leading power factor, output filter.

It is not recommended that any changes be made in the commutation circuitry, which accounts for at most, a few hundred watts of loss at 400 Hz. It is recommended that consideration be given both by MERADCOM and Delco to implementation of an incrementally variable output filter. The present filter draws 1.1 PU rated output current at 0 PF, leading. This is responsible for as much as 2 kW loss at no load. At no-load and light-loads, smaller filters would greatly reduce inverter losses and, consequently, converter losses and improve loaded efficiency. At rated load, Delco should evaluate the use of a 0.9 to 1.0 PU output filter to slightly improve rated load efficiency.

Temperature checks made on the fully enclosed frequency changer showed several areas of excessive temperature rise. Although some improvement was made by providing more air flow to these areas, they are still too hot for safe operation at 125°F ambient air. It is strongly recommended that thorough temperature tests be made and that redesign efforts be directed to reduction of temperature rise in areas where problems are found to exist.

SECTION V DESCRIPTION OF TESTS

5.1 TEST APPARATUS

The general test set-ups used during the electrical performance testing are shown in Figures 15 and 16. The test apparatus makes use of a dual channel, x-y, transfer switch designed and built by Delco Electronics. The transfer switch provides for rapid, manual switching between various phase voltages and currents so that the desired input function can be directed to the appropriate recording and monitoring instrumentation which are listed in Table 3. The schematic diagram of the transfer switch is provided in Figure 17. Figures 18 and 19 provide descriptive block diagrams for the Deviation Factor and Amplitude Modulation tests, respectively. The methods used are much less time consuming and more accurate than those specified in MIL-STD-705B and results are, otherwise, equivalent.

The instruments and equipment, support and measuring, used during the performance of the tests are given by number (corresponding to the TE Number in Table 3) in Table 4.

5.2 TEST PROCEDURES

The test procedures are abbreviated MIL-STD-705B procedures. These procedures, nevertheless, yield results of accuracy equal to or better than standard MIL-STD-705B.

The frequency changer is tested at one input and one output frequency at a time. For tests at different output frequencies, it is shut down and reconnected appropriately.

Test 1 - Frequency and Voltage Regulation, Stability (short term) and Transient Response, MIL-STD-705B Test Method 608.1a.

The set's output frequency is crystal controlled, so there is no regulation or transient response to be measured. Stability is as good as the crystal itself. Output frequency is recorded at 60 Hz and 400 Hz, nominal.

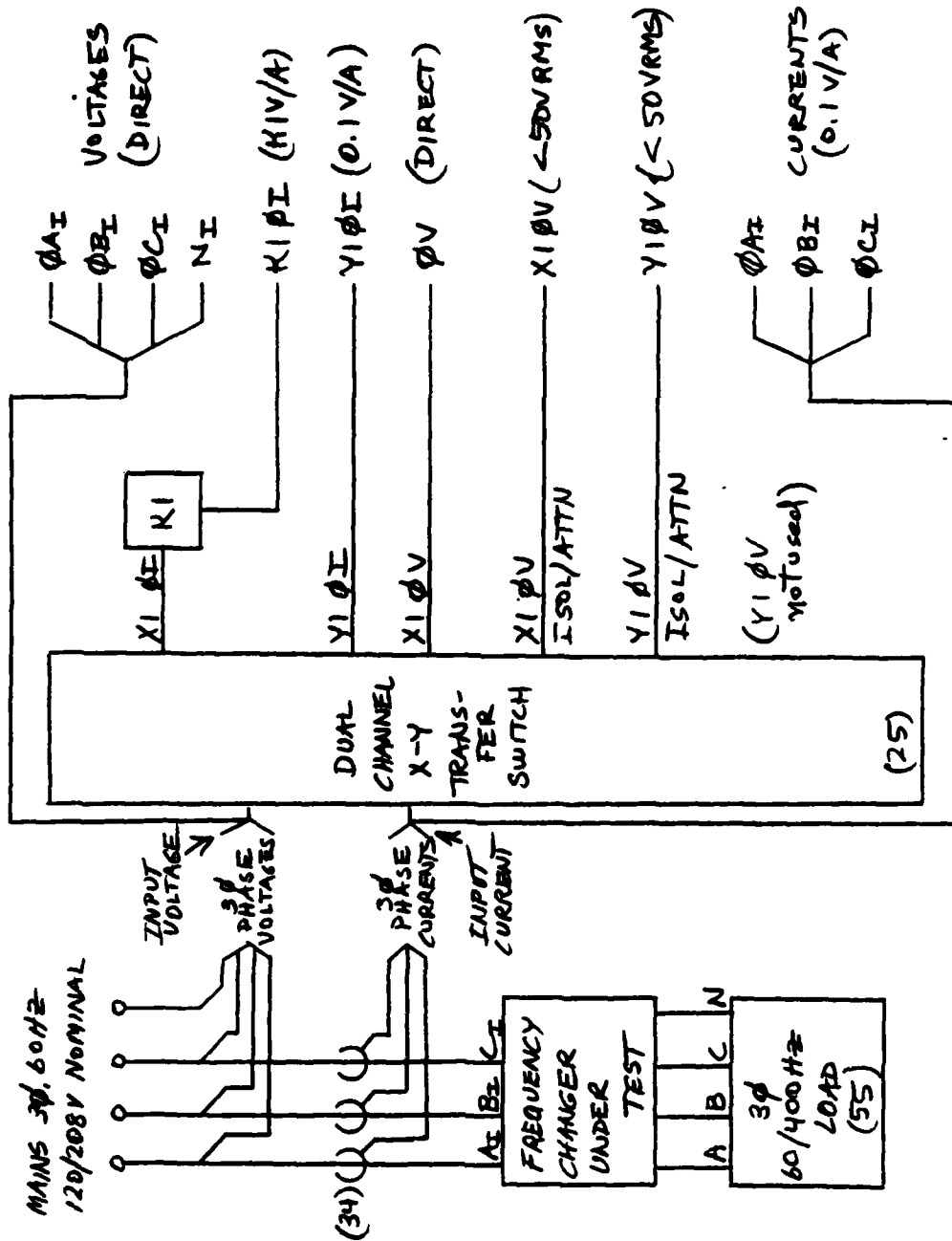


Figure 15. Frequency Changer Input Test Set Up

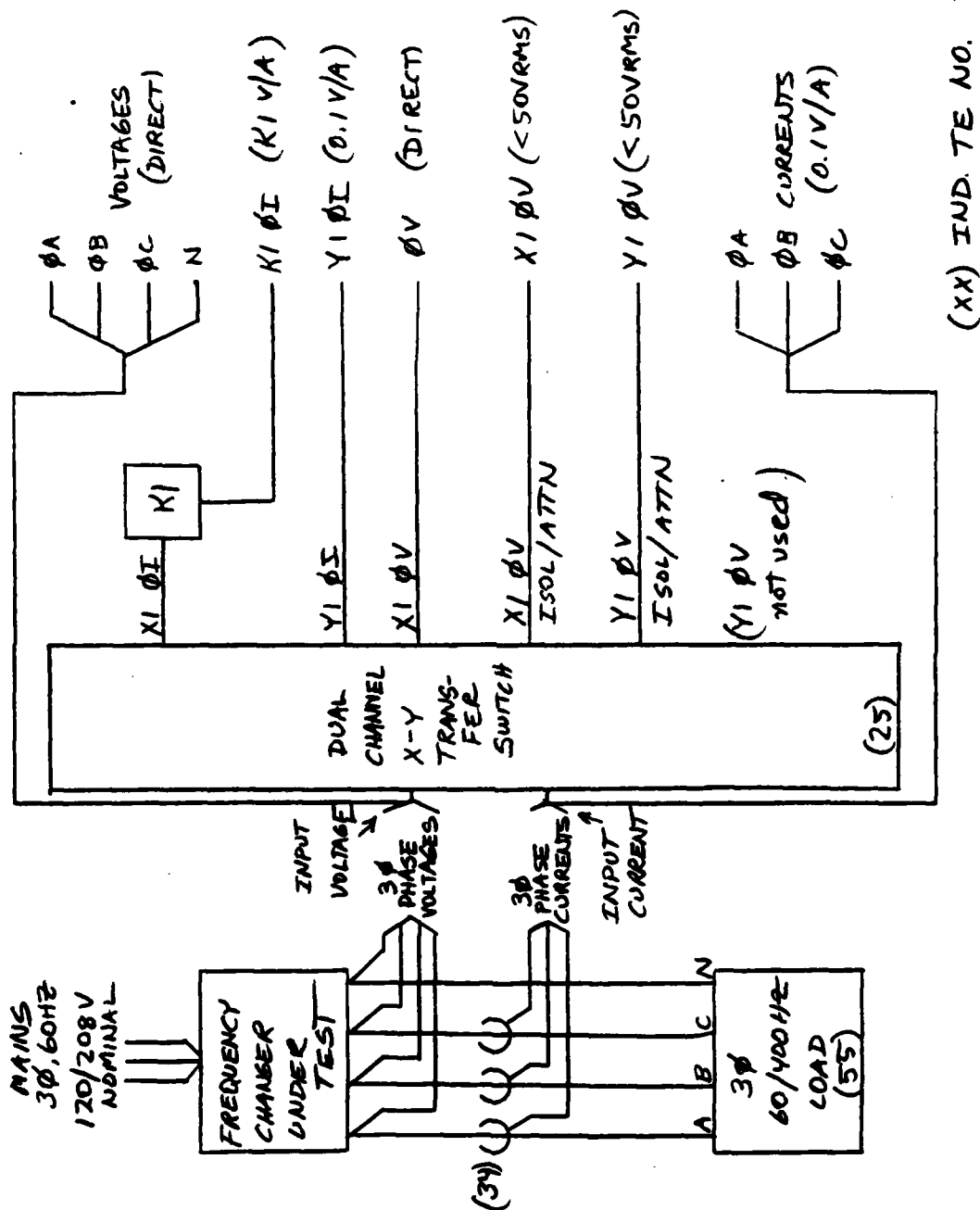


Figure 16. Frequency Changer Output Test Set Up

(XX) IND. TE NO.

<u>FROM</u>	<u>TO</u>	<u>EQUIPMENT</u>	<u>TE NO.</u>
Ø A - N Volt (Dir)	Fluke 8040A true RMS DVM		(7)
Ø B - N Volt (Dir)	Fluke 8040A true RMS DVM		(8)
Ø C - N Volt (Dir)	Fluke 8040A true RMS DMV		(9)
K1 Ø I	Yew 288559/2805 Wattmeter Y Channel Direct		(13)
Y1 Ø I	HP 3580A Spectrum Analyzer (for current analysis)		(17)
	HP 331A Distortion Analyser (for current THD)		(15)
	HP 302A Wave Analyzer (for current analysis)		(16)
	TEK 7704A Oscilloscope with (42), (43), (44), (45), (46) (for current observation)		(39)
	HP 3575A Gain/Phase Meter (Channel B for power factor)		(14)
X1 Ø Volt (Dir)	Yew 288559/2805 Wattmeter X Channel Voltage - 150V Input		(13)
X1 Ø Volt (Isol/Attn)	HP 4245 L Counter (for waveform frequency)		(20)
Y1 Ø Volt (Isol/Attn)	HP 3580A Spectrum Analyzer (for voltage analysis)		(17)
	HP 331A Distortion Analyzer (for voltage THD)		(15)
	HP 302A Wave Analyzer (for voltage analysis)		(16)
	TEK 7704A Oscilloscope with (42), (43), (44), (45), (46) (for voltage observation)		(39)
	HP 3575A Gain/Phase Meter (Channel A for power factor)		(14)
	K-H 3750R Filter (for voltage deviation factor)		(18)
Ø A Current (0.1V/A)	Fluke 8600A DVM		(10)
Ø B Current (0.1 V/A)	Fluke 8000A DVM		(11)
Ø C Current (0.1 V/A)	Fluke 8000A DVM		(12)

Table 3. Frequency Changer Test, Test Equipment Utilization

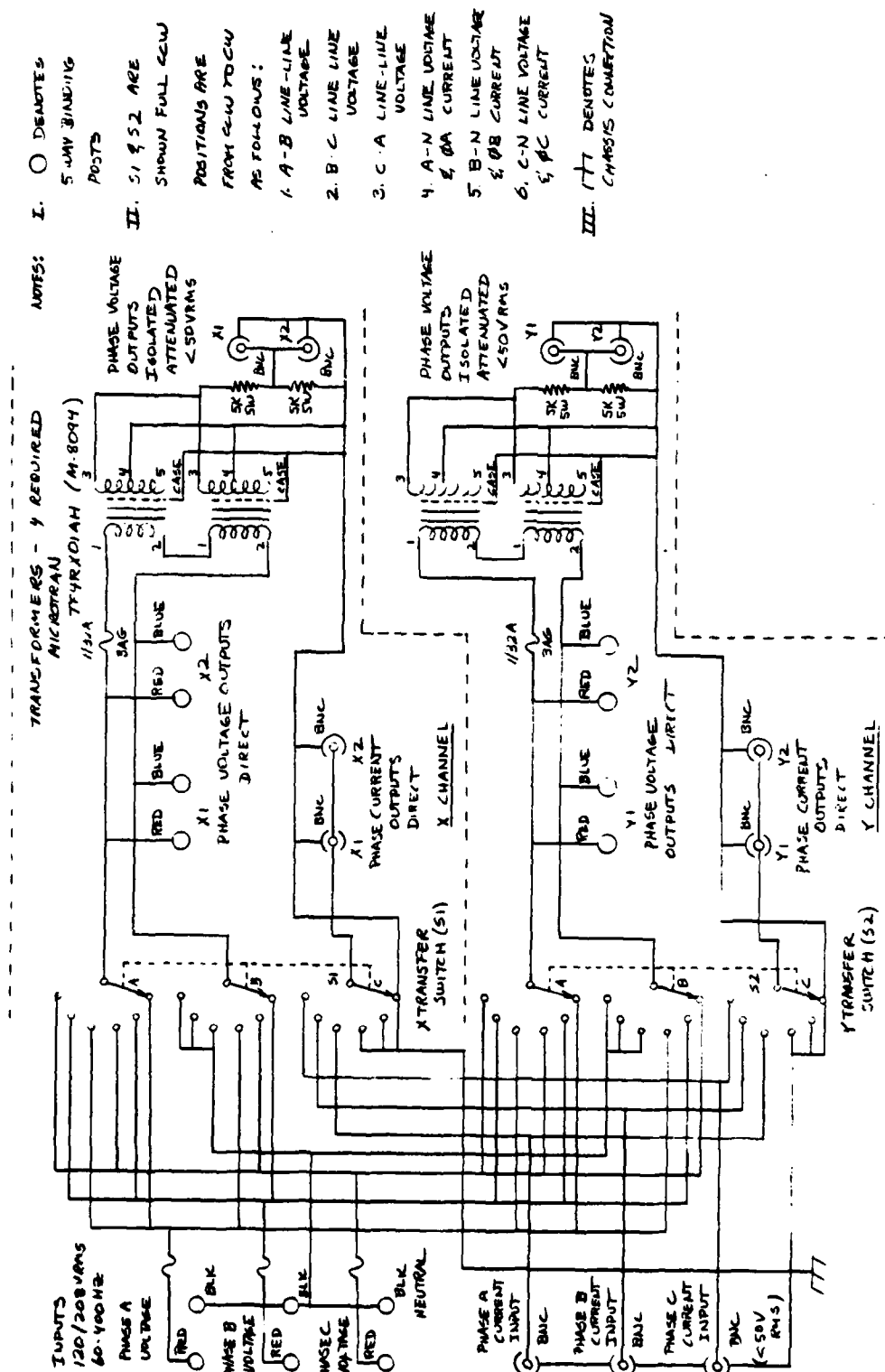


Figure 17. Dual Channel Transfer Switch for MIL-STD-705B Testing - Schematic



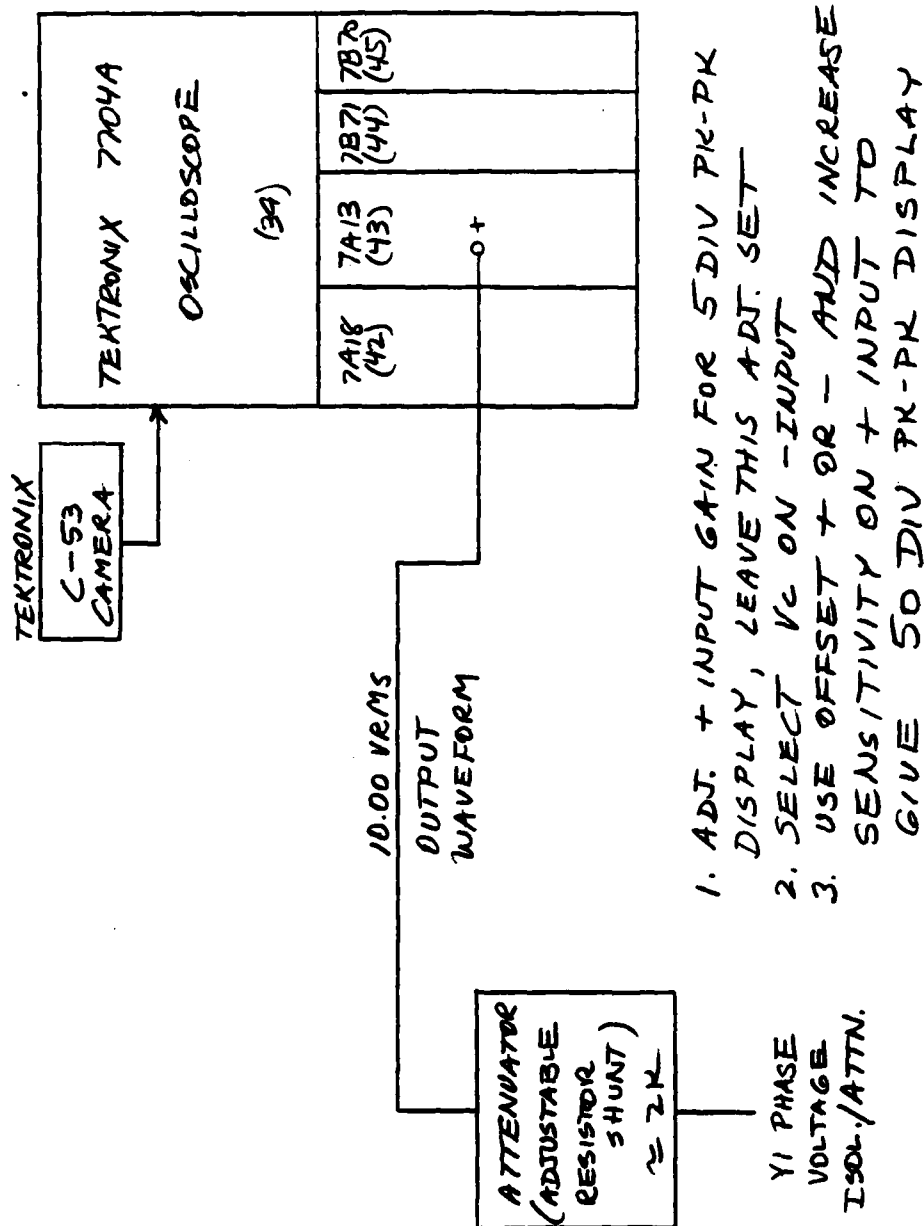


Figure 19. Set Up for Amplitude Modulation Measurement

DELCO ELECTRONICS DIVISION • SANTA BARBARA OPERATIONS • GENERAL MOTORS CORPORATION

<u>TE NO.</u>	<u>MODEL/DESCRIPTION</u>	<u>IDENT</u>
1.	HP 3400A True rms Voltmeter	IL 17669
2.	HP 400E AC Voltmeter	IL 12795C
3.	HP 400E AC Voltmeter	IL 12796C
4.	HP 3400A True rms Voltmeter	IL 13116C
5.	HP 3400A True rms Voltmeter	IL 12939C
6.	HP 3400A True rms Voltmeter	IL 12075ST
7.	Fluke 8040A True rms DVM	IL 18036
8.	Fluke 8040A True rms DVM	IL 17971
9.	Fluke 8040A True rms DVM	IL 17969
10.	Fluke 8600A DVM	IL 17968
11.	Fluke 8000A DVM	IL 17967
12.	Fluke 8000A DVM	IL 16135
13.	Yew 2885S9/ 2805 Dig Wattmeter	IL 18153
14.	HP 3575A Gain/Phase Meter	IL 17972
15.	HP 331A Distortion Analyzer	IL 17984
16.	HP 302A Wave Analyzer	IL 11853-L
17.	HP 3580A Spectrum Analyzer	IL 17582
18.	Krohn-Hite 3323R Filter	IL 18984
19.	HP 403A AC Voltmeter	DSD 22040
20.	HP 5245L Counter	IL 15423
21.	HP 3450A Multifunction DVM w/rms	IL 14411
22.	White 3702 DC Pass Filter	
23.	White 3704 60 Hz Notch Filter	
24.	White 2939 400 Hz Notch Filter	
25.	Delco Dual Channel Transfer Switch	
26.	HP 3300A/3302A Function Generator	IL 16434/IL 16435
27.	HP 5243L Counter	IL 11966
28.	Fluke 8020A DVM	IL 18188
29.	Fluke 8020A DVM	IL 18189
30.	Weston 931 DC Ammeter	IL 12771

Table 4 (Sheet 1 of 2). Test Equipment, Support and Measuring

DELCO ELECTRONICS DIVISION • SANTA BARBARA OPERATIONS • GENERAL MOTORS CORPORATION

<u>TE NO.</u>	<u>MODEL/DESCRIPTION</u>	<u>IDENT</u>
31.	HP 467A Power Amplifier	IL 14358
32.	HP 3400 Attenuator Set	IL 12716
33.	(6 each) Topaz 91095-22 Ultra-Isolation Transformer	
34.	(6 each) Pearson 110 Wide Band Current Transformer	
35.	Pearson 301X Wide Band Current Transformer	
36.	Fluke 8040A DVM	IL 18035
37.	Fluke 2100A Digital Thermometer	IL 18243
38.	Philips PM 3265 Multiplier Oscilloscope	IL 18291
39.	TEK 7704A Oscilloscope	IL 16692
40.	TEK 7704A Oscilloscope	DRL 14968
41.	TEK 7704A Oscilloscope	DRL 14970
42.	TEK 7A18 Dual Trace Amplifier	IL 16693
43.	TEK 7A26 Dual Trace Amplifier	IL 17733
44.	TEK 7B71 Delaying Time Base	IL 16695
45.	TEK 7B70 Time Base	IL 16696
46.	TEK 7A13 Differential Comp	IL 16849
47.	TEK 7A13 Differential Comp	IL 18222
48.	TEK 7A18	IL 16694
49.	TEK 7A18	IL 18314
50.	TEK 7B53A	IL 16971
51.	TEK P6042 DC-50 MHz Current Probe	IL 16872
52.	TEK AM503/P6302	
	DC-50 MHz Current Probe	IL 18320
53.	TEK FG504 40 MHz Function Generator	
54.	TEK P6042 DC-50 MHz Current Probe	IL 14387
55.	(2 ea) UMC Model Eng Type 15 Load Bank, 15 kW	
56.	YEW 2514-47/2505 30 Wattmeter	IL 19109

Table 4 (Sheet 2 of 2). Test Equipment, Support and Measuring

Voltage regulation is recorded at no load (NL), 0.25 rated load (0.25 RL), 0.25 full load (0.25 FL), 0.5 rated load (0.50 RL), 0.5 full load (0.50 FL), 0.75 rated load (0.75 RL), 0.75 full load (0.75 FL), rated load (RL), and at full load (FL).

Rated load is defined as 15 kW, 0.8 PF. Full load is defined as 15 kW, 1.0 PF. Regulation is calculated as follows:

1. At each load point calculate the average of the 3-phase output voltages.
Let these be A_X (where $X = 1, 2, \dots, N$ and N is the number of load points).
2. Calculate the average output voltage for the series of loads as
 $D = A_1 + A_2 + \dots A_N / N$.
3. Regulation at each point X is

$$\frac{A_X - D}{D} \times 100, \text{ in percent}$$

Stability at a load point X is the maximum deviation in percent from an average calculated for each phase at that load point X .

For transient response, the recovery time, and overshoot or undershoot, as applicable are measured. Recovery time is the time from removal of load or application of load, as applicable until the output voltage stabilizes within the specified regulation band.

Overshoot is determined as follows:

1. Measure no load voltage, V_{NL}
2. Measure loaded voltage, V_{XL}
3. Let R be the maximum peak-to-peak excursion measured on the oscillogram during the transient
4. Let NL be the stabilized peak-to-peak excursion measured on the oscillogram after the transient has subsided.
5. Calculate
$$V_R = \frac{R V_{NL}}{NL}$$
6. Calculate overshoot = $\frac{V_R - V_{XL}}{V_{XL}} \times 100, \text{ in percent}$

Similarly undershoot is determined as follows:

1. Measure loaded voltage, V_{XL}
2. Measure no-load voltage, V_{NL}
3. Let D be the minimum peak-to-peak excursion measured on the oscillogram during the transient.
4. Let XL be the stabilized peak-to-peak excursion measured on the oscillogram after the transient has subsided.
5. Calculate

$$V_D = \frac{DV_{XL}}{XL}$$
6. Calculate undershoot = $\frac{V_{XL} - V_D}{V_{XL}} \times 100$, in percent

Test 2 - Voltage Waveform, MIL-STD-705B Test Method 601.1c, Oscillographic, and Test Method 601.4a, Harmonic Analysis

The oscillographic test is used to determine the deviation factor of the output waveform. The test set up is described in Figure 18. The output waveform (attenuated) is fed into the plus (+) input of the oscilloscope at 10 divisions peak-to-peak deflection. A filtered version of this waveform which has its distortion components removed (THD < 0.05%) is fed into the minus (-) input. The phase of the reference sine wave so obtained is adjusted by changing the cut-off of the filter. The amplitude is adjusted by using the reference amplitude adjustment. Phase and amplitude of the reference are adjusted for minimum peak-to-peak deflection of the difference signal displayed and recorded on the oscilloscope. This then is the deviation only.

The deviation factor is calculated as follows:

1. Measure the peak-to-peak deviation of the waveform in divisions. Let this be D .
2. Deviation factor = $D/10 \times 100$, in percent.

Waveform harmonic analysis consists of THD measurement as well as the measurement of each harmonic (out to the 50th). These are done directly as indicated in Paragraph 5.1.

Test 3 - DC Content, MIL-STD-705B, Test Method - None applicable.

For dc content the White 3702 passive low pass filter is used. The output of this filter is read with a dc voltmeter directly. The White 3702 filter is designed for line-to-neutral measurements only.

Test 4 - Voltage Modulation, MIL-STD-705B Test Method 602.1a

The voltage modulation test set-up is shown in Figure 19. This set-up depends on the unique capability of the Tektronics 7A13 plug-in which permits a signal to be expanded over 100 times off screen and offset so that any portion of the expanded signal may be viewed. For purposes of voltage modulation measurement, the positive and then negative peaks are so viewed. Peak-to-peak modulation voltage is found as follows:

1. Adjust the gain for the + signal input (that is, uncalibrated mode) for exactly 5 divisions peak-to-peak display.
2. Call the display expansion factor E.
3. Let $E = 10$
4. Offset - input (use V_C) so that either the positive peaks or the negative peaks, as required, may be viewed.
5. Let M equal to the difference between the highest and lowest peak viewed in divisions. (Use single sweep with at least 10 peaks.)
6. Measure the input voltage to the + signal input. Let this be V_L .

7. Let

$$K = \frac{V_{L-N}}{V_L}$$

for line-to-neutral measurements.

Let

$$K = \frac{V_{L-L}}{V_L}$$

for line-to-line measurements.

8. Voltage modulation = $2\sqrt{2} V_L KM/5E = 0.566 V_L KM/E$, for 120 V line-to-neutral measurements. Voltage modulation = $67.9 M/E$ volts peak-to-peak.

Test 5 – Frequency Modulation, MIL-STD-705B, Test Method 602.1a

The output frequency of the frequency changer is crystal controlled. Since there is no measurable frequency modulation, this test is not performed.

Test 6 – Voltage Dip for Low Power Factor Loads, MIL-STD-705B, Test Method 619.1c.

Recovery time, as observed on an oscillogram, is the time interval starting with the application of the low power factor load and terminating when the output voltage stabilizes at the loaded value. The low power factor load is one with a 0.5 PU impedance and a power factor of 0.4 or less. Voltage dip, stated in percent of rated voltage, is determined as follows:

1. Measure loaded voltage, V_{XL}
2. Measure no load voltage, V_{NL} (120.0V)
3. Let D be the minimum peak-to-peak excursion measured on the oscillogram during the transient.
4. Let XL be the stabilized peak-to-peak excursion measured on the oscillogram after the transient has subsided.
5. Calculate
$$V_D = \frac{DV_{XL}}{XL}$$
6. Calculate dip = $\frac{V_D - V_{XL}}{120} \times 100$, in percent.

Test 7 – Voltage Dip and Rise for Rated Load, MIL-STD-705B, Test Method 619.2b

For the application of rated load recovery time and dip are determined. Recovery time is the time from application of rated load for the output voltages to stabilize within the specified regulation band. Dip in percent is determined as follows:

1. Measure loaded voltage, V_{RL}
2. Measure no load voltage, V_{NL}

3. Let D be the minimum peak-to-peak excursion measured on the oscillogram during the transient.
4. Let RL be the stabilized peak-to-peak excursion measured on the oscillogram after the transient has subsided.
5. Calculate

$$V_D = \frac{DV_{RL}}{RL}$$

6. Calculate dip = $\frac{V_{RL} - V_D}{120} \times 100$, in percent.

For the removal of rated load, recovery time and rise are determined. Recovery time is the time from removal of rated load for the output voltage to stabilize within the specified regulation band. Rise in percent is determined as follows:

1. Measure no load voltage, V_{NL}
2. Measure loaded voltage, V_{RL}
3. Let R be the maximum peak-to-peak excursion measured on the oscillogram during the transient.
4. Let NL be the stabilized peak-to-peak excursion measured on the oscillogram after the transient has subsided.

5. Calculate

$$V_R = \frac{RV_{NL}}{NL}$$

6. Calculate rise = $\frac{V_R - V_{NL}}{120} \times 100$, in percent.

Test 8 – Summation of Losses and Efficiency, MIL-STD-705B, Test Method - None applicable.

This test is accomplished to measure the frequency changer's converter losses, the frequency changer's inverter losses, and the overall frequency changer losses at no-load. In addition, at 0.25 RL, 0.25 FL, 0.5 RL, 0.5 FL, 0.75 RL, 0.75 FL, rated load (RL), and full load (FL), these losses are measured. At these loads converter efficiency, inverter efficiency, and overall frequency changer efficiencies are determined as follows:

1. Measure frequency changer power circuit input power, $P_{IN CONV}$

2. Measure frequency changer converter output power (inverter input power), $P_{OUT CONV}$
3. Measure frequency changer output power, P_{LOAD}
4. Measure all other losses, such as logic input power, cooling fan power, etc. Sum these powers, P_{AUX}
5. Converter power circuit efficiency = $\frac{P_{OUT CONV}}{P_{IN CONV}} \times 100$, in percent.
6. Inverter power circuit efficiency = $\frac{P_{LOAD}}{P_{OUT CONV}} \times 100$, in percent.
7. Overall power circuit efficiency = $\frac{P_{LOAD}}{P_{IN CONV}} \times 100$, in percent.
8. Overall frequency changer efficiency = $\frac{P_{LOAD}}{P_{IN CONV} + P_{AUX}} \times 100$, in percent.

Test 9 - Voltage Adjustment Range (Regulator Range), MIL-STD-705B Test Method 511.1c

At no load and at rated load measure the minimum line-to-neutral output voltage with the voltage adjustment set full counterclockwise. This must be less than or equal to that specified in the procurement document. At no load and at rated load measure the maximum line-to-neutral output voltage with the voltage adjustment set full clockwise. This must equal or exceed that specified in the procurement document.

Test 10 - Circuit Interrupter, MIL-STD-705B, Test Method 512.1c

With the set operating under rated load, apply single-phase, two-phase, and three-phase short circuits. In each case, measure the value of short circuit current and the time it takes for the output contactor to open.

5.3 TEST DATA

Original data for PD required testing appears in this section in the following order:

1-A	60 Hz out, No Load, 120V out	Note A
1-B	0.25 RL,	
1-C	0.25 FL,	
1-D	0.50 RL,	
1-E	0.50 FL,	
1-F	0.75 RL,	
1-G	0.75 FL,	
1-H	RL,	
1-I	FL,	
1-J	NL to RL transient, 120V out	
1-K	RL to NL transient,	
1-L	NL to LPF transient,	
1-M	RL to 1 ϕ SC transient,	
1-N	RL to 2 ϕ SC transient,	
1-O	RL to 3 ϕ SC transient,	
4-A	400 Hz out, No Load, 120 V out	
4-B	0.25 RL,	
4-C	0.25 FL,	
4-D	0.50 RL,	
4-E	0.50 FL,	
4-F	0.75 RL,	
4-G	0.75 FL,	
4-H	RL,	
4-I	FL,	



EQUIP DESCRIPTION MERADCOM

15 KW FC

SANTA BARBARA, CALIFORNIA

TEST NO. 1A

SHEET 1 OF 4

TEST DESCRIPTION INPUT V-I-PWR

60 Hz NL

DATE 01-21-80

PROJ ENGR G.H. B...

TEST BY G.H.B.

OBSERVER

MFGR DELCO

MODEL NO. _____

SERIAL NO. REF: MIL-STD-705B

(1) MEASUREMENT	(2) INST NO.(c)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
INPUT ϕ A VOLTAGE		<u>120.07</u>		<u>V</u>				
ϕ A CURRENT		<u>9.13</u>		<u>A</u>				
ϕ A PHASE ANGLE		<u>+49.0</u>		<u>deg</u>				
ϕ A POWER		<u>660</u>		<u>W</u>				
ϕ B VOLTAGE		<u>120.37</u>		<u>V</u>				
ϕ B CURRENT		<u>8.75</u>		<u>A</u>				
ϕ B PHASE ANGLE		<u>+39.9</u>		<u>deg</u>				
ϕ B POWER		<u>677</u>		<u>W</u>				
ϕ C VOLTAGE		<u>120.83</u>		<u>V</u>				
ϕ C CURRENT		<u>8.51</u>		<u>A</u>				
ϕ C PHASE ANGLE		<u>+46.2</u>		<u>deg</u>				
ϕ C POWER		<u>611</u>		<u>W</u>				
CONV FREQUENCY				<u>Hz</u>				
Σ POWER		<u>1950 W</u>						
PERIOD OUTPUT		<u>1667150 μS</u>						

NOTES: Freq out 60.0 Hz T = 16.667150 μ S F = 59.990260 Hz

ERROR = -0.0028999%

EQUIP DESCRIPTION

TEST NO. 1ASHEET 2 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT CURRENT WAVEFORM

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕA THD		33.0%	2.13 53.0	5.7 %	RL 9.13 RL 53.0	1AB, 1AC	NOTE A	
(b) ϕB THD				%				
(c) ϕC THD				%				
(d) ϕA WV ANALYSIS		72.9%	2.13 53.0	5.6%	72.9% 72.9	1AA	NOTE A	
(e) ϕB WV ANALYSIS								
(f) ϕC WV ANALYSIS								
(g) ϕA DEV FACTOR				%				
(h) ϕB DEV FACTOR				%				
(i) ϕC DEV FACTOR				%				
(j) ϕA VMOD POS				V				
(k) ϕA VMOD NEG				V				
(l) ϕB VMOD POS				V				
(m) ϕB VMOD NEG				V				
(n) ϕC VMOD POS				V				
(o) ϕC VMOD NEG				V				

NOTES:

A: DISTORTION % RELATED TO RL INPUT CURRENT

EQUIP DESCRIPTION

TEST NO. 1A

SHEET 3 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT, V-I-PWR

60 Hz NL

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE		120.0		V				
(b) ϕA CURRENT		0		A				
(c) ϕA PHASE ANGLE		—		deg				
(d) ϕA POWER		0		W				
(e) ϕB VOLTAGE		120.2		V				
(f) ϕB CURRENT		0		A				
(g) ϕB PHASE ANGLE		—		deg				
(h) ϕB POWER		0		W				
(i) ϕC VOLTAGE		120.3		V				
(j) ϕC CURRENT		0		A				
(k) ϕC PHASE ANGLE		—		deg				
(l) ϕC POWER		0		W				
(m) ϕA VDC				+31 mV				± 100
(n) ϕB VDC				-23 mV				± 100
(o) ϕC VDC				+15 mV				± 100

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 1A

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

MFGR

60 Hz AL

DATE

PROJ ENGR

TEST BY

OBSERVER

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
OUTPUT ϕ A THD				2.56 %		1A7a	2.69%	50%
ϕ B THD				2.55 %				
ϕ C THD				2.61 %				
ϕ A WV ANALYSIS					1.49% 5th	1A7a		20%
ϕ B WV ANALYSIS					1.39% 7th	1A7a	1.49%	20%
ϕ C WV ANALYSIS								
ϕ A DEV FACTOR				4.8 %		1A7a	4.8	50%
ϕ B DEV FACTOR				4.8 %		1A7h		
ϕ C DEV FACTOR				4.8 %		1A7i,12		
ϕ A VMOD POS				0 V		1A7j	NONE	3V
ϕ A VMOD NEG				0 V		1A7k	NONE	3V
ϕ B VMOD POS				V				
ϕ B VMOD NEG				V				
ϕ C VMOD POS				V				
ϕ C VMOD NEG				V				

NOTES:



SANTA BARBARA, CALIFORNIA

EQUIP DESCRIPTION MERIDOM
15RW FC

TEST NO. 1B
SHEET 1 OF 4
DATE 1-22-80
PROJ ENGR C.H. Berrett
TEST BY C.H.B.
OBSERVER

TEST DESCRIPTION INPUT V-I-PWR

60 Hz 1/4 RL

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

REF: MIL-STD-705B

	(1) MEASUREMENT	(2) INST NO.(c)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a)	INPUT ϕ A VOLTAGE		120.7		V				
(b)	ϕ A CURRENT		18.2		A				
(c)	ϕ A PHASE ANGLE		+11.0		deg				
(d)	ϕ A POWER				W				
(e)	ϕ B VOLTAGE		120.2		V				
(f)	ϕ B CURRENT		17.8		A				
(g)	ϕ B PHASE ANGLE		+8.0		deg				
(h)	ϕ B POWER				W				
(i)	ϕ C VOLTAGE		121.5		V				
(j)	ϕ C CURRENT		17.4		A				
(k)	ϕ C PHASE ANGLE		+10.3		deg				
(l)	ϕ C POWER				W				
(m)	CONV FREQUENCY				Hz				
(n)									
(o)									

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 1B
SHEET 2 OF 4
DATE 1-22-80
PROJ ENGR A. H. Barnett
TEST BY _____
OBSERVER _____

TEST DESCRIPTION INPUT CURRENT WAVEFORM

60 Hz 1/4 RL

MFGR

MODEL NO.

REF:

SERIAL NO.

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
INPUT ϕ A THD		11.8		%				
ϕ B THD		11.9		%				
ϕ C THD		13.3	12.4 53.0	4.37 %		IBAC	4.322	5.02
ϕ A WV ANALYSIS					Measure 40%			
ϕ B WV ANALYSIS								
ϕ C WV ANALYSIS						IBC		
ϕ A DEV FACTOR				%				
ϕ B DEV FACTOR				%				
ϕ C DEV FACTOR				%				
ϕ A VMOD POS				V				
ϕ A VMOD NEG				V				
ϕ B VMOD POS				V				
ϕ B VMOD NEG				V				
ϕ C VMOD POS				V				
ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION

TEST NO. 1B

SANTA BARBARA, CALIFORNIA

SHEET 3 OF 4

TEST DESCRIPTION OUTPUT, V-I-PWR

DATE 1-29-80

MFGR

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕ A VOLTAGE				120.1 V				
(b) ϕ A CURRENT				12.89 A				
(c) ϕ A PHASE ANGLE				35.5 deg				
(d) ϕ A POWER				1230 W				
(e) ϕ B VOLTAGE				120.1 V				
(f) ϕ B CURRENT				12.89 A				
(g) ϕ B PHASE ANGLE				35.6 deg				
(h) ϕ B POWER				1232 W				
(i) ϕ C VOLTAGE				120.2 V				
(j) ϕ C CURRENT				12.92 A				
(k) ϕ C PHASE ANGLE				35.7 deg				
(l) ϕ C POWER				1235 W				
(m) ϕ A VDC				+19 mV				
(n) ϕ B VDC				-17 mV				
(o) ϕ C VDC				+11 mV				

NOTES:



SANTA BARBARA, CALIFORNIA

EQUIP DESCRIPTION

TEST NO. 1B

SHEET

4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

MFGR

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA THD				2.27 %		1B7a		
(b) ϕB THD				2.27 %				
(c) ϕC THD				2.28 %			2.28%	5.0%
(d) ϕA WV ANALYSIS				1.4%	1.99% 5th harm	1B7A1.2	1.4%	2.0%
(e) ϕB WV ANALYSIS								
(f) ϕC WV ANALYSIS								
(g) ϕA DEV FACTOR				%		1B7g		
(h) ϕB DEV FACTOR				%		1B7h		
(i) ϕC DEV FACTOR				4.0 %		1B7C1.2	4.0%	5.0%
(j) ϕA VMOD POS				0 V		1B7j	0V	3V
(k) ϕA VMOD NEG				0 V		1B7k	0V	3V
(l) ϕB VMOD POS				V				
(m) ϕB VMOD NEG				V				
(n) ϕC VMOD POS				V				
(o) ϕC VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION _____

SANTA BARBARA, CALIFORNIA

TEST NO. 1C
SHEET 2 OF 4

TEST DESCRIPTION INPUT CURRENT WAVEFORM

60 HZ 1/4 FL

DATE _____
PROJ ENGR _____
TEST BY _____
OBSERVER _____

MFGR _____

MODEL NO. _____

SERIAL NO. _____

REF: _____

	(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a)	INPUT ϕ A THD		<u>14.1</u>		%				
(b)	ϕ B THD		<u>15.1</u>	<u>18.6</u> <u>53.0</u>	<u>5.3</u> %			<u>5.3%</u>	<u>5.8%</u>
(c)	ϕ C THD		<u>15.0</u>		%				
(d)	ϕ A WV ANALYSIS								
(e)	ϕ B WV ANALYSIS								
(f)	ϕ C WV ANALYSIS								
(g)	ϕ A DEV FACTOR			<u>4.2%</u>		<u>4.2% THD</u> <u>ref RL</u>			
(h)	ϕ B DEV FACTOR			%					
(i)	ϕ C DEV FACTOR			%					
(j)	ϕ A VMOD POS			V					
(k)	ϕ A VMOD NEG			V					
(l)	ϕ B VMOD POS			V					
(m)	ϕ B VMOD NEG			V					
(n)	ϕ C VMOD POS			V					
(o)	ϕ C VMOD NEG			V					

NOTES: _____



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 10

SHEET 3 OF 4

TEST DESCRIPTION OUTPUT, V-I-PWR

DATE

MFGR

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.3 V				
(b) ϕA CURRENT				10.46 A				
(c) ϕA PHASE ANGLE				-0.4 deg				
(d) ϕA POWER				1255 W				
(e) ϕB VOLTAGE				120.3 V				
(f) ϕB CURRENT				10.44 A				
(g) ϕB PHASE ANGLE				-0.4 deg				
(h) ϕB POWER				1254 W				
(i) ϕC VOLTAGE				120.5 V				
(j) ϕC CURRENT				10.49 A				
(k) ϕC PHASE ANGLE				-0.4 deg				
(l) ϕC POWER				1260 W				
(m) ϕA VDC				+20 mV				+100mV
(n) ϕB VDC				-23 mV			-23mV	+100mV
(o) ϕC VDC				+16 mV				+100mV

NOTES:

EQUIP DESCRIPTION

TEST NO. 1CSHEET 4 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM60 Hz 1/4 FL

REF:

MFGR

MODEL NO.

SERIAL NO.

(a)	(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a)	OUTPUT ϕA THD				2.28 %		1C7a		
(b)	ϕB THD				2.28 %				
(c)	ϕC THD				2.28 %			2.28 %	5.0 %
(d)	ϕA WV ANALYSIS					1.1 % 5th harm.	1C7d12	1.1 %	2.0 %
(e)	ϕB WV ANALYSIS								
(f)	ϕC WV ANALYSIS								
(g)	ϕA DEV FACTOR				%		1C7g		
(h)	ϕB DEV FACTOR				%		1C7h		
(i)	ϕC DEV FACTOR				4.5 %		1C7i12	4.5 %	5.0 %
(j)	ϕA VMOD POS				0 V		1C7j	0 V	3 V
(k)	ϕA VMOD NEG				0 V		1C7k	0 V	3 V
(l)	ϕB VMOD POS				V				
(m)	ϕB VMOD NEG				V				
(n)	ϕC VMOD POS				V				
(o)	ϕC VMOD NEG				V				

NOTES:

EQUIP DESCRIPTION MERADCOM
15KW FC

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT, V-I-PWR
60 Hz 1/2 RL

REF: MIL-STD-705B

TEST NO. 1 D

SHEET 1 OF 4

DATE 01-22-80

PROJ ENGR B. H. Baxley

TEST BY B. H. B.

OBSERVER _____

(1) MEASUREMENT	(2) INST NO.(g)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE		120.2		V				
(b) ϕ A CURRENT		28.8		A				
(c) ϕ A PHASE ANGLE		+3.0		deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE		120.2		V				
(f) ϕ B CURRENT		28.8		A				
(g) ϕ B PHASE ANGLE		+3.0		deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE		120.8		V				
(j) ϕ C CURRENT		28.0		A				
(k) ϕ C PHASE ANGLE		+3.8		deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n)								
(o)								

NOTES: _____



EQUIP DESCRIPTION

TEST NO. 1D
SHEET 2 OF 4

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT CURRENT WAVEFORM

DATE

PROJ ENGR

TEST BY

OBSERVER

MFGR

MODEL NO.

SERIAL NO.

REF:

60Hz 1/2 RL

(1) MEASUREMENT	(2) INST NO.(c)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD		7.8	$\frac{28.8}{53.0}$	4.2 %				
(b) ϕ B THD		8.4	$\frac{28.8}{53.0}$	4.6 %				
(c) ϕ C THD		9.0	$\frac{28.8}{53.0}$	4.8 %		1D5c	4.8%	5.0%
(d) ϕ A WV ANALYSIS								
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				3.5%	3.5% The harm	1D5f	3.5%	
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION _____

TEST NO. 1D
SHEET 3 OF 4

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT, V-I-PWR

DATE _____
PROJ ENGR _____
TEST BY _____
OBSERVER _____

MFGR _____

MODEL NO. _____

SERIAL NO. _____

REF: _____

	(1) MEASUREMENT	(2) INST NO.(g)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a)	OUTPUT ϕA VOLTAGE				119.8 V				
(b)	ϕA CURRENT				26.00 A				
(c)	ϕA PHASE ANGLE				-36.7 deg				
(d)	ϕA POWER				2472 W				
(e)	ϕB VOLTAGE				120.0 V				
(f)	ϕB CURRENT				25.85 A				
(g)	ϕB PHASE ANGLE				-36.9 deg				
(h)	ϕB POWER				2458 W				
(i)	ϕC VOLTAGE				120.0 V				
(j)	ϕC CURRENT				25.96 A				
(k)	ϕC PHASE ANGLE				-36.3 deg				
(l)	ϕC POWER				2477 W				
(m)	ϕA VDC				+19 mV			+19 mV	1000 mV
(n)	ϕB VDC				-14 mV				
(o)	ϕC VDC				+4 mV				

NOTES: _____



EQUIP DESCRIPTION

TEST NO. 1D

SHEET 4 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

60 Hz 1/2 RL

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA THD				2.28 %		1D7a		
(b) ϕB THD				2.29 %				
(c) ϕC THD				2.30 %			2.30%	5.0%
(d) ϕA WV ANALYSIS				1.8%	1.8% <i>Starkem</i>	1D7A1,2	1.8%	2.0%
(e) ϕB WV ANALYSIS								
(f) ϕC WV ANALYSIS								
(g) ϕA DEV FACTOR				%		1D7g		
(h) ϕB DEV FACTOR				%		1D7h		
(i) ϕC DEV FACTOR				4.5 %		1D7iA	24.5%	5.0%
(j) ϕA VMOD POS				0 V		1D7j	0V	3V
(k) ϕA VMOD NEG				0 V		1D7k	0V	3V
(l) ϕB VMOD POS				V				
(m) ϕB VMOD NEG				V				
(n) ϕC VMOD POS				V				
(o) ϕC VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION MEBACOM
15KW FC

TEST NO. 1E
SHEET 1 OF 4
DATE 01-22-80
PROJ ENGR C. H. Darrell
TEST BY C. H. B.
OBSERVER

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT V-I-PWR
60Hz 1/2 FL

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____ REF: MIL-STD-705B

	(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a)	INPUT ϕ A VOLTAGE		120.5		V				
(b)	ϕ A CURRENT		30.8		A				
(c)	ϕ A PHASE ANGLE		+2.0		deg				
(d)	ϕ A POWER				W				
(e)	ϕ B VOLTAGE		120.5		V				
(f)	ϕ B CURRENT		30.6		A				
(g)	ϕ B PHASE ANGLE		+2.0		deg				
(h)	ϕ B POWER				W				
(i)	ϕ C VOLTAGE		120.9		V				
(j)	ϕ C CURRENT		29.8		A				
(k)	ϕ C PHASE ANGLE		+3.1		deg				
(l)	ϕ C POWER				W				
(m)	CONV FREQUENCY				Hz				
(n)									
(o)									

NOTES:



SANTA BARBARA, CALIFORNIA

EQUIP DESCRIPTION

TEST NO. 1E
SHEET 2 OF 4

TEST DESCRIPTION INPUT CURRENT WAVEFORM

DATE

MFGR

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD		7.5	30.0 33.0	4.4 %				
(b) ϕ B THD		7.5	30.0 33.0	4.4 %				
(c) ϕ C THD		8.6	29.0 33.0	4.8 %		IESC	4.8%	5.0%
(d) ϕ A WV ANALYSIS								
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				3.6%	3.6% \overline{Thkham}	IESF	3.6%	
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:

EQUIP DESCRIPTION

TEST NO.

1E

SHEET

3 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT, V-I-PWR

60 Hz 1/2 FL

MFG#

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.2 V				
(b) ϕA CURRENT				20.91 A				
(c) ϕA PHASE ANGLE				-0.3 deg				
(d) ϕA POWER				2511 W				
(e) ϕB VOLTAGE				120.3 V				
(f) ϕB CURRENT				20.90 A				
(g) ϕB PHASE ANGLE				-0.3 deg				
(h) ϕB POWER				2512 W				
(i) ϕC VOLTAGE				120.4 V				
(j) ϕC CURRENT				20.88 A				
(k) ϕC PHASE ANGLE				-0.3 deg				
(l) ϕC POWER				2509 W				
(m) ϕA VDC				+24 mV			+24 mV	t:100mV
(n) ϕB VDC				-17 mV				
(o) ϕC VDC				+19 mV				

NOTES:



SANTA BARBARA, CALIFORNIA

EQUIP DESCRIPTION

TEST NO. 1E

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

MFGR

PROJ ENGR

MODEL NO.

TEST BY

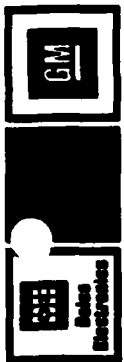
SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
OUTPUT ϕ A THD				2.19 %		1E7a		
ϕ B THD				2.22 %				
ϕ C THD				2.22 %				
ϕ A WV ANALYSIS				1.29%	1.2% 5th harm.	1E7d, 1E7e		
ϕ B WV ANALYSIS								
ϕ C WV ANALYSIS								
ϕ A DEV FACTOR				%		1E7g		
ϕ B DEV FACTOR				%		1E7h		
ϕ C DEV FACTOR				4.0 %		1E7i, 1E7j	24.0%	5.0%
ϕ A VMOD POS				0 V		1E7j	0 V	3 V
ϕ A VMOD NEG				0 V		1E7k	0 V	3 V
ϕ B VMOD POS				V				
ϕ B VMOD NEG				V				
ϕ C VMOD POS				V				
ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION NERADCOM
15KW FC

SANTA BARBARA, CALIFORNIA

TEST NO. 1F
SHEET 1 OF 4

TEST DESCRIPTION INPUT V-I-PWR

DATE 01/27/80
PROJ ENGR C. G. Barrett
TEST BY C. G. B.

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

REF: WIL-STD-705B

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE		120.0		V				
(b) ϕ A CURRENT		41.4		A				
(c) ϕ A PHASE ANGLE		0.0		deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE		120.3		V				
(f) ϕ B CURRENT		41.3		A				
(g) ϕ B PHASE ANGLE		0.0		deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE		120.7		V				
(j) ϕ C CURRENT		40.2		A				
(k) ϕ C PHASE ANGLE		+1.3		deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n)								
(o)								

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 1F

SHEET 2 OF 4

TEST DESCRIPTION INPUT CURRENT WAVEFORM

MFGR

60Hz 3/4 RL

DATE

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(a)	(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a)	INPUT ϕ A THD		4.8	44.4 53.0	3.8 %				
(b)	ϕ B THD		5.8	44.3 53.0	4.5 %		1F56	4.5%	5.0%
(c)	ϕ C THD		5.5	40.2 53.0	4.2 %				
(d)	ϕ A WV ANALYSIS								
(e)	ϕ B WV ANALYSIS				3.3%	3.3% 7th harm.	1F5e	3.3%	
(f)	ϕ C WV ANALYSIS								
(g)	ϕ A DEV FACTOR				%				
(h)	ϕ B DEV FACTOR				%				
(i)	ϕ C DEV FACTOR				%				
(j)	ϕ A VMOD POS				V				
(k)	ϕ A VMOD NEG				V				
(l)	ϕ B VMOD POS				V				
(m)	ϕ B VMOD NEG				V				
(n)	ϕ C VMOD POS				V				
(o)	ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION _____

TEST NO. 1 F

SHEET 3 OF 4

TEST DESCRIPTION OUTPUT, V-I-PWR

DATE _____

MFGR _____

PROJ ENGR _____

MODEL NO. _____

TEST BY _____

SERIAL NO. _____

OBSERVER _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(a)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				119.7 V				
(b) ϕA CURRENT				38.87A				
(c) ϕA PHASE ANGLE				-34.1 deg				
(d) ϕA POWER				3808 W				
(e) ϕB VOLTAGE				119.9 V				
(f) ϕB CURRENT				38.91 A				
(g) ϕB PHASE ANGLE				-34.6 deg				
(h) ϕB POWER				3796 W				
(i) ϕC VOLTAGE				119.8 V				
(j) ϕC CURRENT				39.08 A				
(k) ϕC PHASE ANGLE				-33.7 deg				
(l) ϕC POWER				3854 W				
(m) ϕA VDC				+16 mV			+16 mV	$\pm 100 mV$
(n) ϕB VDC				-10 mV				
(o) ϕC VDC				-1 mV				

NOTES: _____



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 1F

SHEET 4 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
OUTPUT ϕA THD				2.36 %		1F7a		
ϕB THD				2.38 %			2.38%	5.0%
ϕC THD				2.36 %				
ϕA WV ANALYSIS				1.8%	1.8% 5th harm	1F7d, 2	1.8%	2.0%
ϕB WV ANALYSIS								
ϕC WV ANALYSIS								
ϕA DEV FACTOR				%		1F7a		
ϕB DEV FACTOR				%		1F7h		
ϕC DEV FACTOR				4.0 %		1F7i, 2	4.0%	5%
ϕA VMOD POS				0 V		1F7j	0V	3V
ϕA VMOD NEG				0 V		1F7k	0V	3V
ϕB VMOD POS				V				
ϕB VMOD NEG				V				
ϕC VMOD POS				V				
ϕC VMOD NEG				V				

NOTES:

EQUIP DESCRIPTION MERADCOM
15KW FC

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

TEST DESCRIPTION INPUT V-I-PWR

60 Hz 3/4 FL

REF: MIL-STD-705B

TEST NO. 1G

SHEET 1 OF 4

DATE 01/22/80

PROJ ENGR C. B. Baur

TEST BY G. E. B.

OBSERVER _____



SANTA BARBARA, CALIFORNIA

(a)	(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a)	INPUT ϕ A VOLTAGE		118.5		V				
(b)	ϕ A CURRENT		43.3		A				
(c)	ϕ A PHASE ANGLE		-0.2		deg				
(d)	ϕ A POWER				W				
(e)	ϕ B VOLTAGE		119.0		V				
(f)	ϕ B CURRENT		43.5		A				
(g)	ϕ B PHASE ANGLE		-0.3		deg				
(h)	ϕ B POWER				W				
(i)	ϕ C VOLTAGE		119.4		V				
(j)	ϕ C CURRENT		42.4		A				
(k)	ϕ C PHASE ANGLE		+1.0		deg				
(l)	ϕ C POWER				W				
(m)	CONV FREQUENCY				Hz				
(n)									
(o)									

NOTES:



EQUIP DESCRIPTION _____

TEST NO. 1G

SANTA BARBARA, CALIFORNIA

SHEET 2 OF 4

TEST DESCRIPTION INPUT CURRENT WAVEFORM

DATE _____

MFGR _____

PROJ ENGR _____

MODEL NO. _____

TEST BY _____

SERIAL NO. _____

OBSERVER _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD		4.7	43.3	3.8 %				
(b) ϕ B THD		5.4	43.3	4.4 %				
(c) ϕ C THD		5.5	42.4	4.4 %		165C	4.4%	5.0%
(d) ϕ A WV ANALYSIS			53.0					
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				3.3%	3.3% Thk harn	165F	3.3%	
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES: _____



EQUIP DESCRIPTION

TEST NO. 16
SHEET 3 OF 4

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT, V-I-PWR

DATE

PROJ ENGR

TEST BY

OBSERVER

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
OUTPUT ϕA VOLTAGE				120.2 V				
ϕA CURRENT				31.34 A				
ϕA PHASE ANGLE				-0.3 deg				
ϕA POWER				3763 W				
ϕB VOLTAGE				120.2 V				
ϕB CURRENT				31.29 A				
ϕB PHASE ANGLE				-0.3 deg				
ϕB POWER				3764 W				
ϕC VOLTAGE				120.4 V				
ϕC CURRENT				31.27 A				
ϕC PHASE ANGLE				-0.3 deg				
ϕC POWER				3758 W				
ϕA VDC				+22 mV			+22 mV	+100 mV
ϕB VDC				-20 mV				
ϕC VDC				+16 mV				

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 1G
SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

MFGR

DATE

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(a)	(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a)	OUTPUT ϕ A THD				2.10 %		1G7a		
(b)	ϕ B THD				2.13 %			2.13%	5.0%
(c)	ϕ C THD				2.09 %				
(d)	ϕ A WV ANALYSIS				1.3%	1.3% 5th harm	1G7A1,2	1.3%	2.0%
(e)	ϕ B WV ANALYSIS								
(f)	ϕ C WV ANALYSIS								
(g)	ϕ A DEV FACTOR				%		1G7g		
(h)	ϕ B DEV FACTOR				%		1G7h		
(i)	ϕ C DEV FACTOR				4.0 %		1G7i1,2	4.0%	5%
(j)	ϕ A VMOD POS				0 V		1G7j	0V	3V
(k)	ϕ A VMOD NEG				0 V		1G7k	0V	3V
(l)	ϕ B VMOD POS				V				
(m)	ϕ B VMOD NEG				V				
(n)	ϕ C VMOD POS				V				
(o)	ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION 15KW FC
NEERADCOM

SANTA BARBARA, CALIFORNIA

TEST NO. 14
SHEET 1 OF 4

TEST DESCRIPTION INPUT V-I-PWR

DATE 12-12-79

MFGR DELCO

PROJ ENGR C.H. Barnett

MODEL NO. _____

TEST BY C.H.B.

SERIAL NO. _____

OBSERVER _____

REF: MIL-STD-205B

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE		119.9		V				
(b) ϕ A CURRENT		52.98		A				
(c) ϕ A PHASE ANGLE		-0.3		deg				
(d) ϕ A POWER	1514/1208 1514/1208	6282		W				
(e) ϕ B VOLTAGE		119.5		V				
(f) ϕ B CURRENT		52.79		A				
(g) ϕ B PHASE ANGLE		-0.3		deg				
(h) ϕ B POWER		6247		W				
(i) ϕ C VOLTAGE		120.3		V				
(j) ϕ C CURRENT		52.16		A				
(k) ϕ C PHASE ANGLE		+0.1		deg				
(l) ϕ C POWER		6238		W				
(m) CONV FREQUENCY				Hz				
(n) Σ POWER		18767W						
(o)								

NOTES:

η overall = 15000/18767 = 0.80 80.0%

EQUIP DESCRIPTION

TEST NO. 14SHEET 2 OF 4TEST DESCRIPTION INPUT CURRENT WAVEFORM

SANTA BARBARA, CALIFORNIA

MFG

60HZ RL

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD				4.4 %		1Ha		
(b) ϕ B THD				5.0 %			5.0%	5.0%
(c) ϕ C THD				4.3 %				
(d) ϕ A WV ANALYSIS				3.0%	3.0% $2\frac{1}{4}$, $9\frac{1}{4}$	1HAI		
(e) ϕ B WV ANALYSIS				3.9%	3.9% $9\frac{1}{4}$ $2\frac{1}{4}$ $2\frac{1}{4}$ $2\frac{1}{4}$	1HB1	3.9%	
(f) ϕ C WV ANALYSIS				3.0%	3.0% $9\frac{1}{4}$ $2\frac{1}{4}$ $2\frac{1}{4}$ $2\frac{1}{4}$	1HC1		
(g) ϕ A DEV FACTOR				%				
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION _____

SANTA BARBARA, CALIFORNIA

TEST NO. 1H

SHEET 3 OF 4

TEST DESCRIPTION OUTPUT, V-I-PWR

DATE _____

MFGR _____

PROJ ENGR _____

MODEL NO. _____

TEST BY _____

SERIAL NO. _____

OBSERVER _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.4 V				
(b) ϕA CURRENT				51.91 A				
(c) ϕA PHASE ANGLE				-36.1 deg				
(d) ϕA POWER				4956 W				
(e) ϕB VOLTAGE				120.5 V				
(f) ϕB CURRENT				51.86 A				
(g) ϕB PHASE ANGLE				-35.9 deg				
(h) ϕB POWER				4975 W				
(i) ϕC VOLTAGE				120.8 V				
(j) ϕC CURRENT				51.93 A				
(k) ϕC PHASE ANGLE				-36.7 deg				
(l) ϕC POWER				4920 W				
(m) ϕA VDC				+4 mV			+4 mV	1/1000 V
(n) ϕB VDC				-2 mV				
(o) ϕC VDC				+1 mV				

NOTES: _____



EQUIP DESCRIPTION _____

SANTA BARBARA, CALIFORNIA

TEST NO. 1H

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE _____

MFGR _____

PROJ ENGR _____

MODEL NO. _____

TEST BY _____

SERIAL NO. _____

OBSERVER _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA THD				2.33 %		1H7a		
(b) ϕB THD				2.41 %				
(c) ϕC THD				2.37 %				
(d) ϕA WV ANALYSIS				1.39%	1.39% 5K, 7U	1H7d1,2		
(e) ϕB WV ANALYSIS								
(f) ϕC WV ANALYSIS								
(g) ϕA DEV FACTOR				%		1H7g		
(h) ϕB DEV FACTOR				4.5 %		1H7h1,2	4.5%	
(i) ϕC DEV FACTOR				%		1H7i		
(j) ϕA VMOD POS				0 V		1H7j		
(k) ϕA VMOD NEG				0 V		1H7k		
(l) ϕB VMOD POS				V				
(m) ϕB VMOD NEG				V				
(n) ϕC VMOD POS				V				
(o) ϕC VMOD NEG				V				

NOTES: _____

EQUIP DESCRIPTION MERADCOM
15KW FC

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT V-I-PWR

60Hz FL

REF: MIL-STD-705B

TEST NO. 181

SHEET 1 OF 4

DATE 12/21/79

PROJ ENGR A.H. Burt

TEST BY A.H.B.

OBSERVER _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE		120.2		V				
(b) ϕ A CURRENT		54.7		A				
(c) ϕ A PHASE ANGLE		-0.2		deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE		120.0		V				
(f) ϕ B CURRENT		54.9		A				
(g) ϕ B PHASE ANGLE		-0.4		deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE		120.7		V				
(j) ϕ C CURRENT		53.8		A				
(k) ϕ C PHASE ANGLE		0.0		deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n)								
(o)								

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 151

SHEET 2 OF 4

TEST DESCRIPTION INPUT CURRENT WAVEFORM

60 Hz FL

DATE

PROJ ENGR

TEST BY

OBSERVER

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD		5.4		5.4%				
(b) ϕ B THD		6.0		6.0%				
(c) ϕ C THD		6.1		6.1%		1J5c		
(d) ϕ A WV ANALYSIS								
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%	4.290 7th harmon	1J5P		
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 151
SHEET 3 OF 4

TEST DESCRIPTION OUTPUT, V-I-PWR

60Hz FL

DATE

PROJ ENGR

TEST BY

OBSERVER

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.2 V				
(b) ϕA CURRENT				41.57 A				
(c) ϕA PHASE ANGLE				-0.3 deg				
(d) ϕA POWER				4990 W				
(e) ϕB VOLTAGE				120.2 V				
(f) ϕB CURRENT				41.60 A				
(g) ϕB PHASE ANGLE				-0.3 deg				
(h) ϕB POWER				5000 W				
(i) ϕC VOLTAGE				120.2 V				
(j) ϕC CURRENT				41.61 A				
(k) ϕC PHASE ANGLE				-0.3 deg				
(l) ϕC POWER				4996 W				
(m) ϕA VDC				+23 mV			+23 mV	+23 mV
(n) ϕB VDC				-18 mV				
(o) ϕC VDC				+20 mV				

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 1 F.I.

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

PROJ ENGR

TEST BY

OBSERVER

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
OUTPUT ϕ A THD				2.00 %		157a		5%
ϕ B THD				2.05 %			2.05%	5%
ϕ C THD				2.01 %				5%
ϕ A WV ANALYSIS				1.3%	1.3% 5th	157d1,2	1.3%	2%
ϕ B WV ANALYSIS								
ϕ C WV ANALYSIS								
ϕ A DEV FACTOR				%		157g		
ϕ B DEV FACTOR				3.5 %		157h,2	3.5%	5%
ϕ C DEV FACTOR				%		157i		
ϕ A VMOD POS				0 V		157j	0 V	3 V
ϕ A VMOD NEG				0 V		157k	0 V	3 V
ϕ B VMOD POS				V				
ϕ B VMOD NEG				V				
ϕ C VMOD POS				V				
ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION MERADCM
FREQUENCY CHANGER

TEST NO. 1-J,K
SHEET 1 OF 1

TEST DESCRIPTION TRANSIENT
RESPONSE NL → RL → NL

DATE 12-12-79
PROJ ENGR A.H. BARRETT

MFGR DELCO
MODEL NO. 60H2

TEST BY
OBSERVER

REF: MIL-STD-705B

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
NL → RL				14.3%	dip < 250us	1J1	14.3%	20%
NL → RL				14.3%	dip	1J2	14.3%	20%
NL → RL				14.1%	dip	1J3	14.1%	20%
RL → NL				13.1%	rise < 2.5 sec *	1K1*	13.1%	20%
RL → NL				13.1%	rise	1K2*	13.1%	20%
RL → NL				13.7%	rise	1K3*	13.7%	20%
RL → NL				13.1%	rise	1K4*	13.1%	20%
RL → NL				13.1%	rise	1K5*	13.1%	20%
RL → 2.2KΩ DBPF				10.6%	rise < 250ms	1X1	10.6%	NS
				13.7%	rise < 250ms	1K4R	13.7%	20%

NOTES: * 2 sec sec. time cause by improper VCO trim adjust.
This was corrected and 1K4R shows < 250ms recovery
time after this correction.

EQUIP DESCRIPTION MERADCON
15 KW FC

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

TEST DESCRIPTION DIP FOR LOW

POWER FACTOR LOAD

60 HZ

REF: MIL-STD-705 B

TEST NO. 1 L

SHEET 1 OF 1

DATE 1-22-80

PROJ ENGR C. H. BARRICK

TEST BY C. H. B.

OBSERVER _____



SANTA BARBARA, CALIFORNIA

(1) MEASUREMENT	(2) INST NO. (s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) NO LOAD VOLTAGE				120.2 V RMS		1 L 1		
(b) L PF LOAD VOLTAGE				119.5 V RMS				
(c) L PF LOAD CURRENT				66.5 A RMS				
(d) L PF LOAD PF				≈ 0 LAG				
(e) TRANS NL \rightarrow L PF				9.6% DIP	THD = 12%		0.6%	
(f)								
(g) NO LOAD VOLTAGE				120.2 V RMS		1 L 2		
(h) L PF LOAD VOLTAGE				119.5 V RMS				
(i) L PF LOAD CURRENT				78.0 A RMS				
(j) L PF LOAD PF				≈ 0.5 LAG				
(k) TRANS NL \rightarrow L PF				1.3% DIP	THD = 11.8%		-1.3%	
(l)								
(m)								
(n)								
(o)								

NOTES: _____

EQUIP DESCRIPTION MERADCEM15KW FCMFR DELCO

MODEL NO. _____

SERIAL NO. _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION RL → SC60HzREF: MIL-STD-705BTEST NO. 1 MNCSHEET 1 OF 1DATE 1-23-80PROJ ENGR C. G. BerriellTEST BY C. G. B.

OBSERVER _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
RL → 1Φ SC *					OUTPUT PULSATES			
					0 TO 120 ARMS			
RL → 3Φ SC *					WORKS ALMOST EVERYTIME			
					UNSTABLE OUTPUT			
					80 TO 120 ARMS			
RL → 3Φ SC					WORKS FINE			
					110 ARMS			
					STABLE OUTPUT		110	104

NOTES: 2 PU SC CURRENT SPEC IS 104 ARMS* VCO CONTROL NEEDS ADDITIONAL WORKPOWER LIMIT INPUTSBETTER IDC INPUTS



EQUIP DESCRIPTION MEADCOM

15KW FC

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 400 HZ ALL INPUT V-I-PWR

TEST NO. 4A

SHEET 1 OF 4

DATE 1-21-80

PROJ ENGR A.H. Barrett

TEST BY A.H.B.

OBSERVER _____

REF: MIL-STD-705 B

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE		121.07		V				
(b) ϕ A CURRENT		10.05		A				
(c) ϕ A PHASE ANGLE		+42.0		deg				
(d) ϕ A POWER	NEW 254/205	998		W				
(e) ϕ B VOLTAGE		121.16		V				
(f) ϕ B CURRENT		9.85		A				
(g) ϕ B PHASE ANGLE		+35.0		deg				
(h) ϕ B POWER		968		W				
(i) ϕ C VOLTAGE		121.78		V				
(j) ϕ C CURRENT		9.51		A				
(k) ϕ C PHASE ANGLE		+43.0		deg				
(l) ϕ C POWER		940		W				
(m) CONV FREQUENCY				Hz				
(n) Σ POWER		2640						
(o)								

NOTES: PERIOD = 2500.06345 μ s FREQ = 1/PER = 399.789848 [ERROR = -0.0025%]



EQUIP DESCRIPTION _____

TEST NO. 4-A

SANTA BARBARA, CALIFORNIA

SHEET 2 OF 4

TEST DESCRIPTION INPUT CURRENT WAVEFORM

DATE _____

MFGR _____

400Hz NL

PROJ ENGR _____

MODEL NO. _____

TEST BY _____

SERIAL NO. _____

OBSERVER _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD				%				
(b) ϕ B THD				%				
(c) ϕ C THD				%				
(d) ϕ A WV ANALYSIS				2.8%	2.8% 7th harm ref RL	4AA	2.8%	
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%				
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES: _____



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 4A

SHEET 3 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER

TEST DESCRIPTION OUTPUT, V-I-PWR

400Hz NL

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.5 V				
(b) ϕA CURRENT				A				
(c) ϕA PHASE ANGLE				deg				
(d) ϕA POWER				W				
(e) ϕB VOLTAGE				120.7 V				
(f) ϕB CURRENT				A				
(g) ϕB PHASE ANGLE				deg				
(h) ϕB POWER				W				
(i) ϕC VOLTAGE				120.8 V				
(j) ϕC CURRENT				A				
(k) ϕC PHASE ANGLE				deg				
(l) ϕC POWER				W				
(m) ϕA VDC				+47 mV			+47 mV	162 mV
(n) ϕB VDC				-22 mV				
(o) ϕC VDC				+28 mV				

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 4A

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

MFGR

400 Hz N/L

MODEL NO.

SERIAL NO.

REF:

PROJ ENGR

TEST BY

OBSERVER

(1) MEASUREMENT	(2) INST NO. (s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
OUTPUT ϕ A THD				2.23 %		4A7a	2.23%	5.0%
ϕ B THD				2.39 %			2.39%	
ϕ C THD				2.28 %			2.28%	
ϕ A WV ANALYSIS				1.0%	5th harmonic	4A7a, 1, 2	1.0%	2.0%
ϕ B WV ANALYSIS								
ϕ C WV ANALYSIS								
ϕ A DEV FACTOR				%		4A7a		
ϕ B DEV FACTOR				4.7 %		4A7a, 1, 2	4.7%	5%
ϕ C DEV FACTOR				%		4A7a		
ϕ A VMOD POS				0 V		4A7a, 1, 2	0 V	3 V
ϕ A VMOD NEG				0 V		4A7a, 1, 2	0 V	3 V
ϕ B VMOD POS				V				
ϕ B VMOD NEG				V				
ϕ C VMOD POS				V				
ϕ C VMOD NEG				V				

NOTES:

EQUIP DESCRIPTION MERADDOY
15KW FC

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT V-I-PWR

400Hz 114 RL

REF: MIL-STD-705B

TEST NO. 4B

SHEET 1 OF 4

DATE 1-21-60

PROJ ENGR C. H. Barnett

TEST BY C. H. B.

OBSERVER _____

(1) MEASUREMENT	(2) INST NO.(c)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE				V				
(b) ϕ A CURRENT				A				
(c) ϕ A PHASE ANGLE				deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE				V				
(f) ϕ B CURRENT				A				
(g) ϕ B PHASE ANGLE				deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE				V				
(j) ϕ C CURRENT				A				
(k) ϕ C PHASE ANGLE				deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n)								
(o)								

NOTES:

EQUIP DESCRIPTION

TEST NO. 4BSHEET 2 OF 4TEST DESCRIPTION INPUT CURRENT WAVEFORM

DATE

MFGR

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

SANTA BARBARA, CALIFORNIA



(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕA THD				%				
(b) ϕB THD				%				
(c) ϕC THD				%				
(d) ϕA WV ANALYSIS								
(e) ϕB WV ANALYSIS								
(f) ϕC WV ANALYSIS								
(g) ϕA DEV FACTOR				%				
(h) ϕB DEV FACTOR				%				
(i) ϕC DEV FACTOR				%				
(j) ϕA VMOD POS				V				
(k) ϕA VMOD NEG				V				
(l) ϕB VMOD POS				V				
(m) ϕB VMOD NEG				V				
(n) ϕC VMOD POS				V				
(o) ϕC VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 4B

SHEET 3 OF 4

TEST DESCRIPTION OUTPUT, V-I-PWR

DATE

MEGR

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.4 V				
(b) ϕA CURRENT				13.15 A				
(c) ϕA PHASE ANGLE				-40.4 deg				
(d) ϕA POWER				1226 W				
(e) ϕB VOLTAGE				120.6 V				
(f) ϕB CURRENT				13.14 A				
(g) ϕB PHASE ANGLE				-41.0 deg				
(h) ϕB POWER				1222 W				
(i) ϕC VOLTAGE				120.6 V				
(j) ϕC CURRENT				13.13 A				
(k) ϕC PHASE ANGLE				-40.3 deg				
(l) ϕC POWER				1223 W				
(m) ϕA VDC				+24 mV				
(n) ϕB VDC				-18 mV				
(o) ϕC VDC				+11 mV				

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 4B

SANTA BARBARA, CALIFORNIA

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

MFGR

400 Hz 1/4 RL

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(a)	(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a)	OUTPUT ϕ A THD				2.28 %		4B7a	2.28%	5%
(b)	ϕ B THD				2.47 %			2.47%	
(c)	ϕ C THD				2.32 %			2.32%	
(d)	ϕ A WV ANALYSIS				1.39%	1.3% 5th harm	4B7A1,2	1.39%	2%
(e)	ϕ B WV ANALYSIS								
(f)	ϕ C WV ANALYSIS								
(g)	ϕ A DEV FACTOR								
(h)	ϕ B DEV FACTOR								
(i)	ϕ C DEV FACTOR								
(j)	ϕ A VMOD POS				4.8 %		4B7a	4.8%	5.0%
(k)	ϕ A VMOD NEG						4B7A1,2		
(l)	ϕ B VMOD POS				0 V		4B7i	0 V	3 V
(m)	ϕ B VMOD NEG				0 V		4B7j	0 V	3 V
(n)	ϕ C VMOD POS						4B7k		
(o)	ϕ C VMOD NEG								

NOTES:



EQUIP DESCRIPTION MERADCOM

15KV FC

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT V-I-PWR

400Hz 1/4 FL

REF: MIL-STD-205B

TEST NO. 4C

SHEET 1 OF 4

DATE 1-21-80

PROJ ENGR G.B. Darnell

TEST BY G.A.B.

OBSERVER _____

(1) MEASUREMENT	(2) INST NO.(c)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE				V				
(b) ϕ A CURRENT				A				
(c) ϕ A PHASE ANGLE				deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE				V				
(f) ϕ B CURRENT				A				
(g) ϕ B PHASE ANGLE				deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE				V				
(j) ϕ C CURRENT				A				
(k) ϕ C PHASE ANGLE				deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n)								
(o)								

NOTES:

EQUIP DESCRIPTION

TEST NO. 4C

SHEET 2 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT CURRENT WAVEFORM

400 Hz 1/4 FL

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD				%				
(b) ϕ B THD				%				
(c) ϕ C THD				%				
(d) ϕ A WV ANALYSIS								
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%				
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION

TEST NO. 4C

SHEET 3 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT, V-I-PWR

400Hz 1/4 FL

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.6 V				
(b) ϕA CURRENT				10.58 A				
(c) ϕA PHASE ANGLE				-1.2 deg				
(d) ϕA POWER				1271 W				
(e) ϕB VOLTAGE				120.8 V				
(f) ϕB CURRENT				10.55 A				
(g) ϕB PHASE ANGLE				-1.5 deg				
(h) ϕB POWER				1272 W				
(i) ϕC VOLTAGE				120.7 V				
(j) ϕC CURRENT				10.59 A				
(k) ϕC PHASE ANGLE				-1.6 deg				
(l) ϕC POWER				1275 W				
(m) ϕA VDC				+33 mV			133mV	248mV
(n) ϕB VDC				-19 mV				
(o) ϕC VDC				+26 mV				

NOTES:



SANTA BARBARA, CALIFORNIA

EQUIP DESCRIPTION

TEST NO. 4C

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

MFGR

400Hz 14 FL

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

ORSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕ A THD				2.33 %		4C7a	2.33%	5%
(b) ϕ B THD				2.52 %			2.52%	5%
(c) ϕ C THD				2.38 %			2.38%	5%
(d) ϕ A WV ANALYSIS				1.0%	1.0% 5Hz, 11Hz	4C7a, 12	1.0%	2%
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%		4C7a		
(h) ϕ B DEV FACTOR				4.9 %		4C7h, 12	4.9%	5%
(i) ϕ C DEV FACTOR				%		4C7i		
(j) ϕ A VMOD POS				0 V		4C7j	0 V	3V
(k) ϕ A VMOD NEG				0 V		4C7k	0 V	3V
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:

EQUIP DESCRIPTION MELADCOM15KW FCMFR DELCO

MODEL NO. _____

SERIAL NO. _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT V-I-PWR400 Hz 1/2 RLREF: MIL-STD-705BTEST NO. 4DSHEET 1 OF 4DATE 1-22-80PROJ ENGR C.B.B. BARNETTTEST BY C.B.B.

OBSERVER _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE				V				
(b) ϕ A CURRENT				A				
(c) ϕ A PHASE ANGLE				deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE				V				
(f) ϕ B CURRENT				A				
(g) ϕ B PHASE ANGLE				deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE				V				
(j) ϕ C CURRENT				A				
(k) ϕ C PHASE ANGLE				deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n)								
(o)								

NOTES: _____



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 4D
SHEET 2 OF 4

TEST DESCRIPTION INPUT CURRENT WAVEFORM

400Hz 1/2 RL

DATE
PROJ ENGR
TEST BY
OBSERVER

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD				%				
(b) ϕ B THD				%				
(c) ϕ C THD				%				
(d) ϕ A WV ANALYSIS								
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%				
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:

AD-A145 523

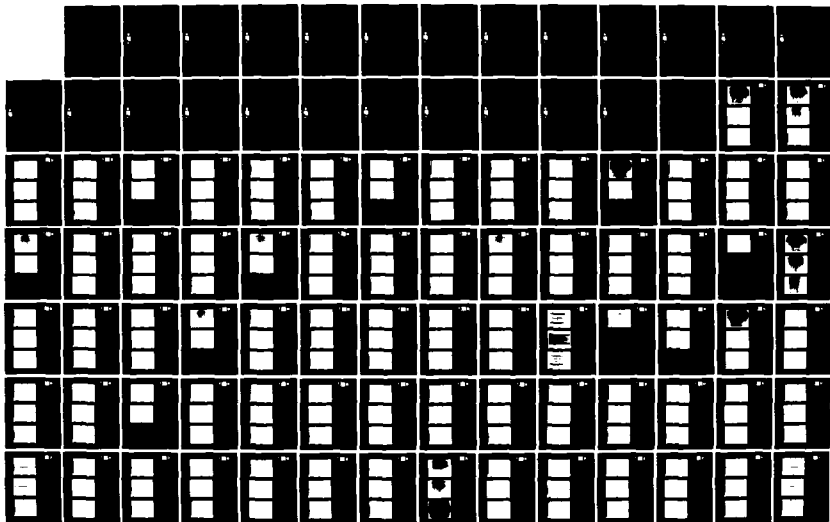
15KW GENERAL PURPOSE POWER CONDITIONER (FREQUENCY
CHANGER)(U) GENERAL MOTORS CORP GOLETA CA DELCO
ELECTRONICS DIV 26 SEP 80 R80-122 DAAK70-77-C-0157

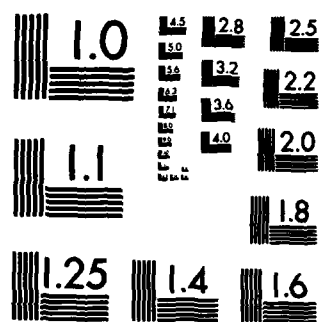
273

UNCLASSIFIED

F/G 10/2

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 4D

SHEET 3 OF 4

TEST DESCRIPTION OUTPUT, V-I-PWR

DATE

PROJ ENGR

TEST BY

OBSERVER

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.3 V				
(b) ϕA CURRENT				26.52 A				
(c) ϕA PHASE ANGLE				-40.0 deg				
(d) ϕA POWER				2466 W				
(e) ϕB VOLTAGE				120.6 V				
(f) ϕB CURRENT				26.43 A				
(g) ϕB PHASE ANGLE				-40.5 deg				
(h) ϕB POWER				2457 W				
(i) ϕC VOLTAGE				120.6 V				
(j) ϕC CURRENT				26.32 A				
(k) ϕC PHASE ANGLE				-39.3 deg				
(l) ϕC POWER				2475 W				
(m) ϕA VDC				+17 mV			+17 mV	±10mV
(n) ϕB VDC				-13 mV				
(o) ϕC VDC				+6 mV				

NOTES:



EQUIP DESCRIPTION

TEST NO. 4D

SANTA BARBARA, CALIFORNIA

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

MFGR

400H2 1/2 RL

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕ A THD				2.32 %		4D7a	2.32%	5%
(b) ϕ B THD				2.44 %			2.44%	
(c) ϕ C THD				2.35 %			2.35%	
(d) ϕ A WV ANALYSIS				1.4%	1.4% SW here	4D7d, 1, 2	1.4%	2%
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%		4D7g		
(h) ϕ B DEV FACTOR				4.5 %		4D7h, 1, 2	4.5%	5%
(i) ϕ C DEV FACTOR				%		4D7i		
(j) ϕ A VMOD POS				0V		4D7j	0V	3V
(k) ϕ A VMOD NEG				0V		4D7k	0V	3V
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION MERAD
15KW PC

TEST NO. 4E
SHEET 1 OF 4

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT V-I-PWR
400Hz 1/2 FL

DATE 1-22-80
PROJ ENGR C. H. S. S. S.
TEST BY C. H. S. S.
OBSERVER

MFGR DELO
MODEL NO. _____
SERIAL NO. _____

REF: MIL-STD-705B

(1) MEASUREMENT	(2) INST NO.(g)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE				V				
(b) ϕ A CURRENT				A				
(c) ϕ A PHASE ANGLE				deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE				V				
(f) ϕ B CURRENT				A				
(g) ϕ B PHASE ANGLE				deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE				V				
(j) ϕ C CURRENT				A				
(k) ϕ C PHASE ANGLE				deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n)								
(o)								

NOTES:



EQUIP DESCRIPTION _____

TEST NO. 4E

SHEET 2 OF 4

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT CURRENT WAVEFORM

DATE _____

MFGR _____

PROJ ENGR _____

MODEL NO. _____

TEST BY _____

SERIAL NO. _____

OBSERVER _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(c)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD				%				
(b) ϕ B THD				%				
(c) ϕ C THD				%				
(d) ϕ A WV ANALYSIS								
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%				
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES: _____



EQUIP DESCRIPTION _____

SANTA BARBARA, CALIFORNIA

TEST NO. 4E

SHEET 3 OF 4

DATE _____

PROJ ENGR _____

TEST BY _____

OBSERVER _____

TEST DESCRIPTION OUTPUT, V-I-PWR

400 Hz 1/2 FL

MFGR _____

MODEL NO. _____

SERIAL NO. _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.5 V				
(b) ϕA CURRENT				21.09 A				
(c) ϕA PHASE ANGLE				-0.4 deg				
(d) ϕA POWER				2537 W				
(e) ϕB VOLTAGE				120.5 V				
(f) ϕB CURRENT				21.03 A				
(g) ϕB PHASE ANGLE				-0.4 deg				
(h) ϕB POWER				2533 W				
(i) ϕC VOLTAGE				120.6 V				
(j) ϕC CURRENT				20.99 A				
(k) ϕC PHASE ANGLE				-0.4 deg				
(l) ϕC POWER				2528 W				
(m) ϕA VDC				+35 mW			+35mV	4.000V
(n) ϕB VDC				-22 mW				
(o) ϕC VDC				+17 mW				

NOTES: _____



EQUIP DESCRIPTION

TEST NO. 4E

SANTA BARBARA, CALIFORNIA

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

MFGR

400H2 112 FL

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA THD				2.53 %		4E70	2.53%	5%
(b) ϕB THD				2.72 %			2.72%	5%
(c) ϕC THD				2.53 %			2.53%	5%
(d) ϕA WV ANALYSIS				1.3%	1-3% (1/4 wave)	4E71,2		2.5% (1/4 wave)
(e) ϕB WV ANALYSIS								
(f) ϕC WV ANALYSIS								
(g) ϕA DEV FACTOR				%		4E79		
(h) ϕB DEV FACTOR				5.1 %		4E71,2	5.1%	5%
(i) ϕC DEV FACTOR				%		4E71		
(j) ϕA VMOD POS				0 V		4E71	0V	3V
(k) ϕA VMOD NEG				0 V		4E7K	0V	3V
(l) ϕB VMOD POS				V				
(m) ϕB VMOD NEG				V				
(n) ϕC VMOD POS				V				
(o) ϕC VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION MERADCON

15KW FC

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT V-I-PWR

400Hz 3/4 RL

REF: MIL-STD-205B

TEST NO. 4F

SHEET 1 OF 4

DATE 1-22-80

PROJ ENGR C. B. Barrett

TEST BY C. B. B.

OBSERVER _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE				V				
(b) ϕ A CURRENT				A				
(c) ϕ A PHASE ANGLE				deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE				V				
(f) ϕ B CURRENT				A				
(g) ϕ B PHASE ANGLE				deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE				V				
(j) ϕ C CURRENT				A				
(k) ϕ C PHASE ANGLE				deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n)								
(o)								

NOTES:



EQUIP DESCRIPTION _____

TEST NO. 4 F
SHEET 2 OF 4

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT CURRENT WAVEFORM

DATE _____

MFGR _____

PROJ ENGR _____

MODEL NO. _____

TEST BY _____

SERIAL NO. _____

OBSERVER _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(G)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD				%				
(b) ϕ B THD				%				
(c) ϕ C THD				%				
(d) ϕ A WV ANALYSIS								
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%				
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES: _____



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 47

SHEET 3 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER

TEST DESCRIPTION OUTPUT, V-I-PWR

400 Hz 3/4 RL

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.2 V				
(b) ϕA CURRENT				39.48 A				
(c) ϕA PHASE ANGLE				-36.8 deg				
(d) ϕA POWER				3781 W				
(e) ϕB VOLTAGE				120.6 V				
(f) ϕB CURRENT				39.48 A				
(g) ϕB PHASE ANGLE				-37.6 deg				
(h) ϕB POWER				3773 W				
(i) ϕC VOLTAGE				120.5 V				
(j) ϕC CURRENT				39.49 A				
(k) ϕC PHASE ANGLE				-35.9 deg				
(l) ϕC POWER				3837 W				
(m) ϕA VDC				+10 mV			+10 mV	+10 mV
(n) ϕB VDC				-6 mV				
(o) ϕC VDC				+2 mV				

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 4F

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

MFGR

400Hz 3/4RL

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕ A THD				2.23 %		4F7a	2.23%	5%
(b) ϕ B THD				2.26 %			2.26%	1
(c) ϕ C THD				2.25 %			2.25%	
(d) ϕ A WV ANALYSIS				1.4%	1.4% 5th harm.	4F7d1,2	1.4%	2%
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%		4F7g		
(h) ϕ B DEV FACTOR				4.5 %		4F7h1,2	4.5%	5%
(i) ϕ C DEV FACTOR				%		4F7i		
(j) ϕ A VMOD POS				0V		4F7j	0V	3V
(k) ϕ A VMOD NEG				0V		4F7k	0V	3V
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:

EQUIP DESCRIPTION MERADCOM

15KW FC

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT V-I-PWR

400H2 3/4 FL

REF: MIL-STD-705B

TEST NO. 4G

SHEET 1 OF 4

DATE 1-22-80

PROJ ENGR A. G. B. Smith

TEST BY C. G. B.

OBSERVER _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE				V				
(b) ϕ A CURRENT				A				
(c) ϕ A PHASE ANGLE				deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE				V				
(f) ϕ B CURRENT				A				
(g) ϕ B PHASE ANGLE				deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE				V				
(j) ϕ C CURRENT				A				
(k) ϕ C PHASE ANGLE				deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n)								
(o)								

NOTES:

EQUIP DESCRIPTION

TEST NO. 46

SHEET 2 OF 4

DATE

PROJ ENGR

TEST BY

OBSERVER



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT CURRENT WAVEFORM

400 Hz 3/4 FL

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(g)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD				%				
(b) ϕ B THD				%				
(c) ϕ C THD				%				
(d) ϕ A WV ANALYSIS								
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%				
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				V				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:

EQUIP DESCRIPTION

TEST NO. 4G

SANTA BARBARA, CALIFORNIA

SHEET 3 OF 4

MFGR

TEST DESCRIPTION OUTPUT, V-I-PWR

DATE

MODEL NO.

PROJ ENGR

SERIAL NO.

TEST BY

OBSERVER

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
OUTPUT ϕA VOLTAGE				120.5 V				
ϕA CURRENT				31.52 A				
ϕA PHASE ANGLE				-0.3 deg				
ϕA POWER				3794 W				
ϕB VOLTAGE				120.6 V				
ϕB CURRENT				31.48 A				
ϕB PHASE ANGLE				-0.3 deg				
ϕB POWER				3795 W				
ϕC VOLTAGE				120.6 V				
ϕC CURRENT				31.42 A				
ϕC PHASE ANGLE				-0.3 deg				
ϕC POWER				3785 W				
ϕA VDC				+27 mV			+27 mV	+100 mV
ϕB VDC				-22 mV				
ϕC VDC				+18 mV				

NOTES:



EQUIP DESCRIPTION

TEST NO. 46
SHEET 4 OF 4

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

MFGR

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕ A THD				2.24 %		467a	2.24%	5%
(b) ϕ B THD				2.34 %			2.34%	1
(c) ϕ C THD				2.28 %			2.28%	
(d) ϕ A WV ANALYSIS				1.1%	1.1% 11th harm	467d12	1.1%	2%
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				%		467g		
(h) ϕ B DEV FACTOR				4.6 %		467h12	4.6%	5%
(i) ϕ C DEV FACTOR				%		467i		
(j) ϕ A VMOD POS				OV		467j	OV	3V
(k) ϕ A VMOD NEG				OV		467k	OV	3V
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:

EQUIP DESCRIPTION MERADCOM
15KW FC


SANTA BARBARA, CALIFORNIA

TEST NO. 44
SHEET 1 OF 4
DATE 12-13-79
PROJ ENGR C.H. Barrett
TEST BY C.H.B.
OBSERVER R. WILLIAMS

TEST DESCRIPTION INPUT V-I-PWR
400HZ OUTPUT RL

MFGR DELCO

MODEL NO. _____

SERIAL NO. _____

REF: MIL-STD-705B

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE		120.9		V				
(b) ϕ A CURRENT		53.54		A				
(c) ϕ A PHASE ANGLE		-0.3		deg				
(d) ϕ A POWER		6404		W				
(e) ϕ B VOLTAGE		120.1		V				
(f) ϕ B CURRENT		53.59		A				
(g) ϕ B PHASE ANGLE		-0.3		deg				
(h) ϕ B POWER		6399		W				
(i) ϕ C VOLTAGE		121.6		V				
(j) ϕ C CURRENT		53.11		A				
(k) ϕ C PHASE ANGLE		+0.3		deg				
(l) ϕ C POWER		6429		W				
(m) CONV FREQUENCY				Hz				
(n) Σ POWER		19232						
(o)								

NOTES:

overall = 14620/19232 = 0.76 76.0%



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 44

SHEET 2 OF 4

TEST DESCRIPTION INPUT CURRENT WAVEFORM

DATE

MFGR

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A THD		5.1%		5.1 %				
(b) ϕ B THD		5.8%		5.8 %			5.8%	5%
(c) ϕ C THD		5.5%		5.5 %				
(d) ϕ A WV ANALYSIS						4HA1		
(e) ϕ B WV ANALYSIS						4HB1		
(f) ϕ C WV ANALYSIS						4HC1		
(g) ϕ A DEV FACTOR				4.2%	4.2% 76 H			
(h) ϕ B DEV FACTOR				%				
(i) ϕ C DEV FACTOR				%				
(j) ϕ A VMOD POS				%				
(k) ϕ A VMOD NEG				V				
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:

EQUIP DESCRIPTION _____

TEST NO. 44

SHEET 3 OF 4

DATE _____

PROJ ENGR _____

TEST BY _____

OBSERVER _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT, V-I-PWR

MFGR _____

MODEL NO. _____

SERIAL NO. _____

REF: _____

(1) MEASUREMENT	(2) INST NO. (a)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE		120.3		V				
(b) ϕA CURRENT		51.95		A				
(c) ϕA PHASE ANGLE		-37.1		deg				
(d) ϕA POWER		4760		W				
(e) ϕB VOLTAGE		121.6		V				
(f) ϕB CURRENT		51.90		A				
(g) ϕB PHASE ANGLE		-36.9		deg				
(h) ϕB POWER		4860		W				
(i) ϕC VOLTAGE		120.6		V				
(j) ϕC CURRENT		52.01		A				
(k) ϕC PHASE ANGLE		-34.0		deg				
(l) ϕC POWER		5000		W				
(m)								
(n)		14620						
(o)								

NOTES: _____

EQUIP DESCRIPTION

TEST NO.

44

SHEET

3A

OF

4

DATE

PROJ ENGR

TEST BY

OBSERVER

TEST DESCRIPTION OUTPUT, V-I-PWR

400 Hz RL

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
OUTPUT ϕ A VOLTAGE				121.3 V				
ϕ A CURRENT				53.02 A				
ϕ A PHASE ANGLE				-36.5 deg				
ϕ A POWER				4949 W				
ϕ B VOLTAGE				121.3 V				
ϕ B CURRENT				52.71 A				
ϕ B PHASE ANGLE				-36.4 deg				
ϕ B POWER				4945 W				
ϕ C VOLTAGE				121.6 V				
ϕ C CURRENT				52.51 A				
ϕ C PHASE ANGLE				-36.7 deg				
ϕ C POWER				4881 W				
ϕ A VDC				+ 4 mV			+ 4 mV	6.200 V
ϕ B VDC				+ 1 mV				
ϕ C VDC				+ 1 mV				

NOTES:



EQUIP DESCRIPTION

TEST NO. 4H
SHEET 4 OF 4

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

PROJ ENGR

TEST BY

OBSERVER

MFGR

MODEL NO.

SERIAL NO.

400H3 RL

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕ A THD				2.64 %		4H7a	2.64%	5%
(b) ϕ B THD				2.58 %			2.58%	
(c) ϕ C THD				2.59 %			2.59%	
(d) ϕ A WV ANALYSIS				2.0%	2.0% 5% H	4H7a, 2	2.0%	2.0%/H
(e) ϕ B WV ANALYSIS								
(f) ϕ C WV ANALYSIS								
(g) ϕ A DEV FACTOR				4.8 %		4H7g, 12	4.8%	5%
(h) ϕ B DEV FACTOR				%		4H7h		
(i) ϕ C DEV FACTOR				%		4H7i		
(j) ϕ A VMOD POS				0 V		4H7j	0 V	3 V
(k) ϕ A VMOD NEG				0 V		4H7k	0 V	3 V
(l) ϕ B VMOD POS				V				
(m) ϕ B VMOD NEG				V				
(n) ϕ C VMOD POS				V				
(o) ϕ C VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION MERADCOY
15KW FC

TEST NO. 4I
SHEET 1 OF 4
DATE 1-22-80
PROJ ENGR C. G. Daniels
TEST BY C. G. Daniels
OBSERVER _____

SANTA BARBARA, CALIFORNIA
TEST DESCRIPTION INPUT V-I-PWR
400Hz FL

MFR DELCO

MODEL NO. _____

SERIAL NO. _____

REF: MIL-STD-705B

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕ A VOLTAGE				V				
(b) ϕ A CURRENT				A				
(c) ϕ A PHASE ANGLE				deg				
(d) ϕ A POWER				W				
(e) ϕ B VOLTAGE				V				
(f) ϕ B CURRENT				A				
(g) ϕ B PHASE ANGLE				deg				
(h) ϕ B POWER				W				
(i) ϕ C VOLTAGE				V				
(j) ϕ C CURRENT				A				
(k) ϕ C PHASE ANGLE				deg				
(l) ϕ C POWER				W				
(m) CONV FREQUENCY				Hz				
(n) _____								
(o) _____								

NOTES:

EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 41
SHEET 2 OF 4

TEST DESCRIPTION INPUT CURRENT WAVEFORM

400HZ FL

DATE

PROJ ENGR

TEST BY

OBSERVER

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) INPUT ϕA THD				%				
(b) ϕB THD				%				
(c) ϕC THD				%				
(d) ϕA WV ANALYSIS								
(e) ϕB WV ANALYSIS								
(f) ϕC WV ANALYSIS								
(g) ϕA DEV FACTOR				%				
(h) ϕB DEV FACTOR				%				
(i) ϕC DEV FACTOR				%				
(j) ϕA VMOD POS				V				
(k) ϕA VMOD NEG				V				
(l) ϕB VMOD POS				V				
(m) ϕB VMOD NEG				V				
(n) ϕC VMOD POS				V				
(o) ϕC VMOD NEG				V				

NOTES:



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 41

SHEET 3 OF 4

TEST DESCRIPTION OUTPUT, V-I-PWR

MFGR

DATE

PROJ ENGR

TEST BY

OBSERVER

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕA VOLTAGE				120.5 V				
(b) ϕA CURRENT				41.78 A				
(c) ϕA PHASE ANGLE				-0.3 deg				
(d) ϕA POWER				5031 W				
(e) ϕB VOLTAGE				120.6 V				
(f) ϕB CURRENT				41.78 A				
(g) ϕB PHASE ANGLE				-0.3 deg				
(h) ϕB POWER				5036 W				
(i) ϕC VOLTAGE				120.5 V				
(j) ϕC CURRENT				41.69 A				
(k) ϕC PHASE ANGLE				-0.3 deg				
(l) ϕC POWER				5019 W				
(m) ϕA VDC				+23 mV			123mV	1200mV
(n) ϕB VDC				-19 mV				
(o) ϕC VDC				+13 mV				

NOTES:



EQUIP DESCRIPTION

TEST NO. 41

SANTA BARBARA, CALIFORNIA

SHEET 4 OF 4

TEST DESCRIPTION OUTPUT VOLTAGE WAVEFORM

DATE

MFGR

PROJ ENGR

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

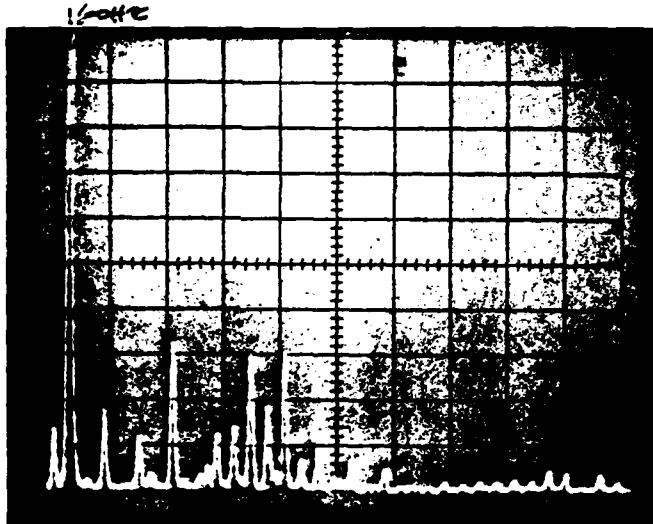
REF:

(a)	(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(b)	OUTPUT ϕ A THD				2.19 %		417a	2.19%	5%
(c)	ϕ B THD				2.28 %			2.28%	1
(d)	ϕ C THD				2.26 %			2.26%	
(e)	ϕ A WV ANALYSIS				1.29%	1.29% 11U6 H	417d1,2		29%/H
(f)	ϕ B WV ANALYSIS								
(g)	ϕ C WV ANALYSIS								
(h)	ϕ A DEV FACTOR				%		417g		
(i)	ϕ B DEV FACTOR				4.6 %		417h1,2	4.6%	5%
(j)	ϕ C DEV FACTOR				%		417i		
(k)	ϕ A VMOD POS				0V		417j	0V	3V
(l)	ϕ A VMOD NEG				0V		417k	0V	3V
(m)	ϕ B VMOD POS				V				
(n)	ϕ B VMOD NEG				V				
(o)	ϕ C VMOD POS				V				
(p)	ϕ C VMOD NEG				V				

NOTES:

5.4 TEST PHOTOGRAPHS

Spectrum analyzer and oscilloscope photographs appear in this section in the same sequence as the corresponding test data presented in Paragraph 5.3.



Solco
Electronics



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT
CURRENT

V1 I ϕ A 10 μ A/DIV

V2

V3 200 Hz/DIV

V4

H1

H2

TEST NO. 1A

PIX NO. 1AA



V1 I ϕ A INPUT 50A/DIV

V2

V3

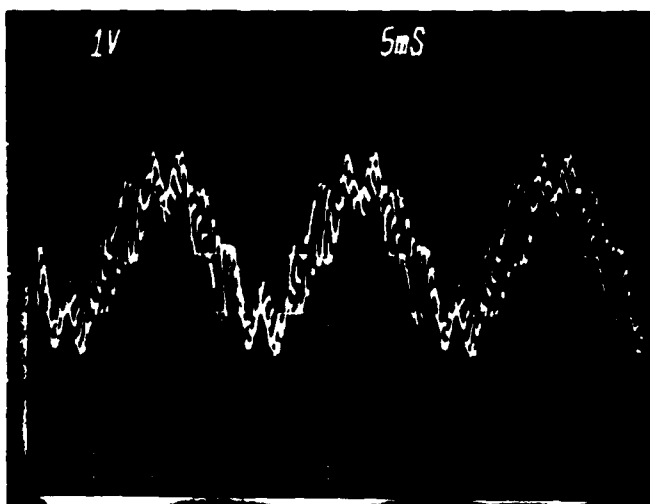
V4

H1

H2

TEST NO.

PIX NO. 1AB



V1 I ϕ A INPUT 10A/DIV

V2

V3

V4

H1

H2

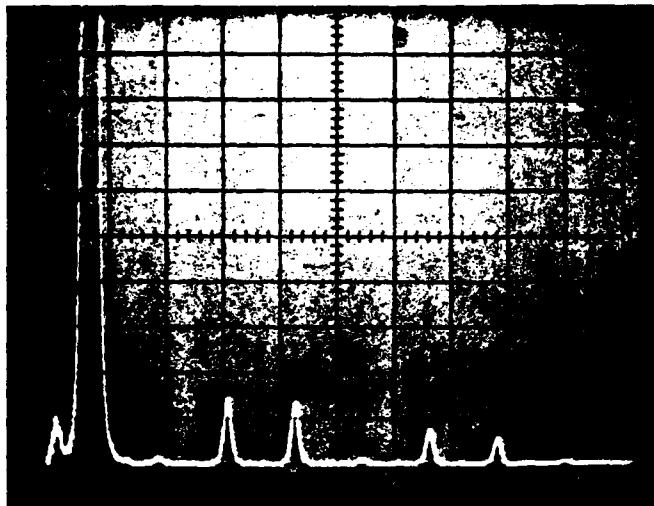
TEST NO.

PIX NO. 1AC



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION



V1 V ϕ A 190/DIV

V2

V3

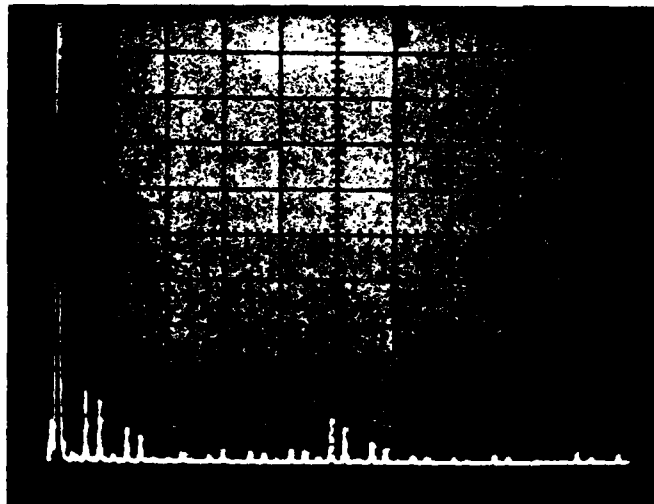
V4

H1 100Hz/DIV

H2

TEST NO. 1A

PIX NO. 1A7d1



V1 V ϕ A 190/DIV

V2

V3

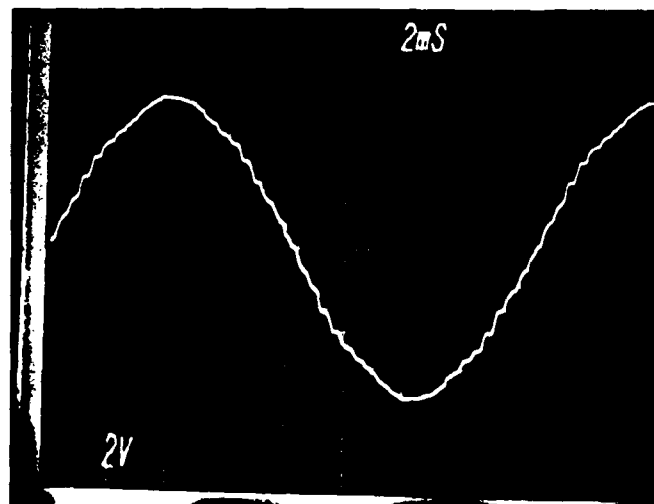
V4

H1 500Hz/DIV

H2

TEST NO. 1A

PIX NO. 1A7d2



V1 V ϕ A

V2

V3

V4

H1

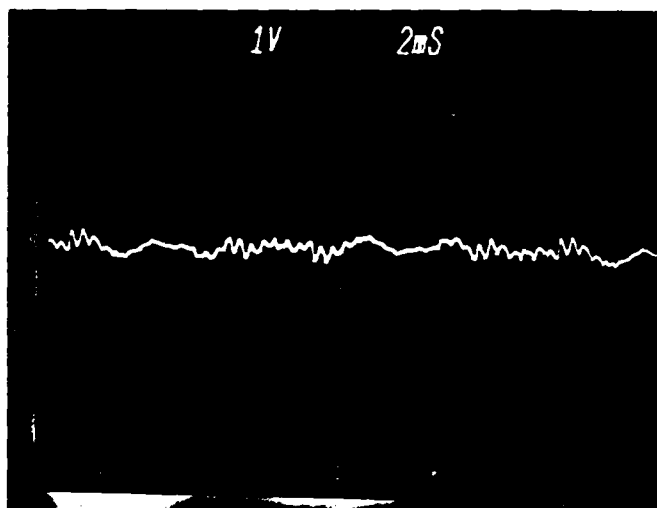
H2

TEST NO. 1A

PIX NO. 1A7a



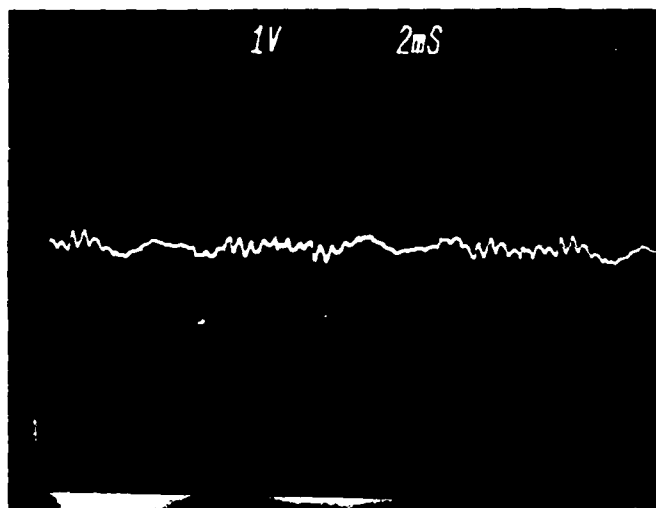
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION NL 60Hz
DEVIATION FACTOR

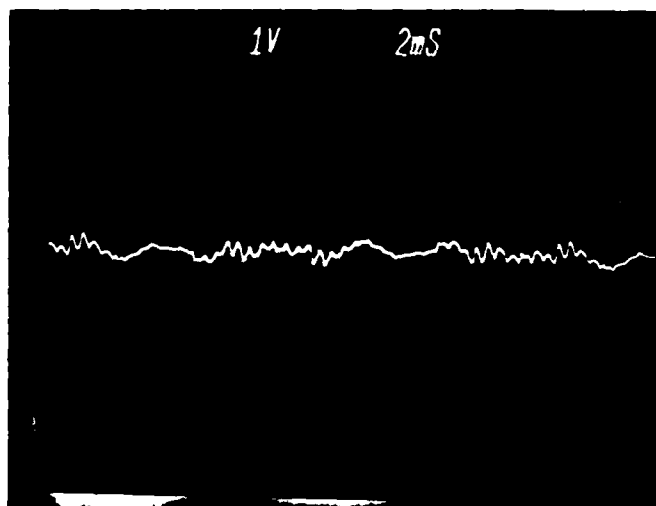
V1 0A 10% / DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1A
PIX NO. 1A7g



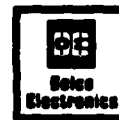
V1 0B 10% / DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1A
PIX NO. 1A7h

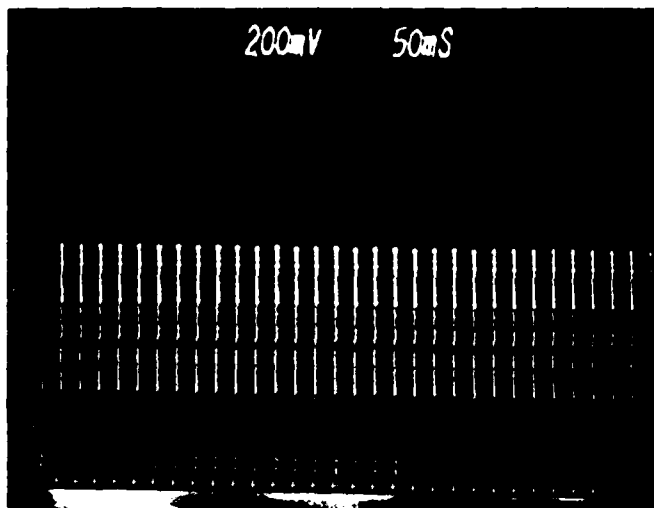


V1 0C 10% / DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1A
PIX NO. 1A7i



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz NL

AMPLITUDE MODULATION
2. DEVIATION

V1 V ϕ A

V2 _____

V3 _____

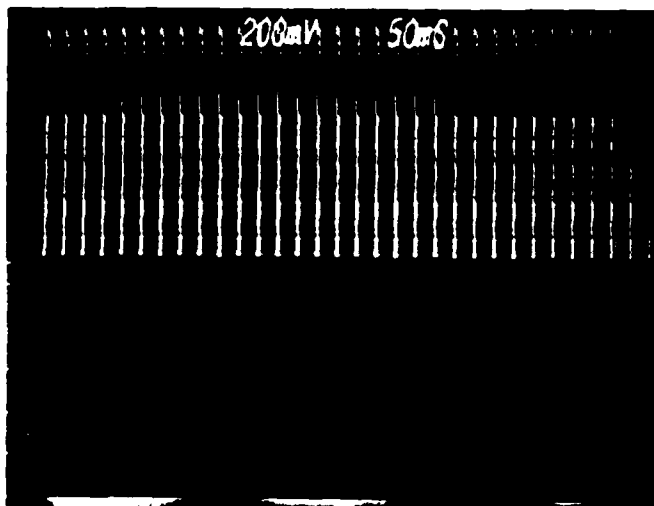
V4 _____

H1 _____

H2 _____

TEST NO. 1A

PIX NO. 1A7j



V1 V ϕ A

V2 _____

V3 _____

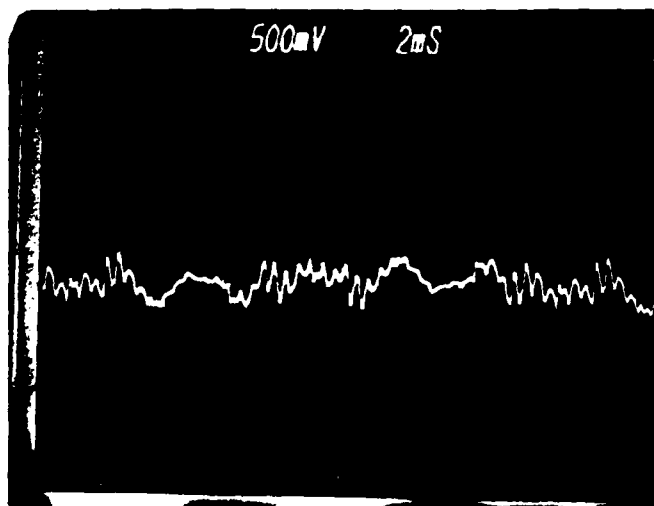
V4 _____

H1 _____

H2 _____

TEST NO. 1A

PIX NO. 1A7K



V1 V ϕ 500/DIV

V2 _____

V3 _____

V4 _____

H1 _____

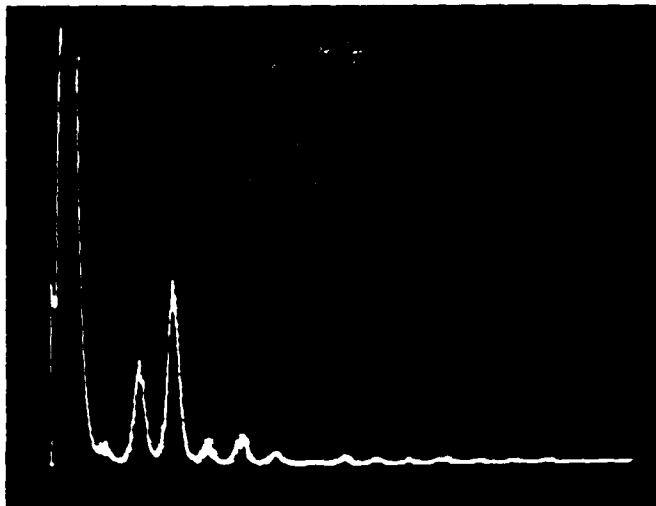
H2 _____

TEST NO. 1A

PIX NO. 1A7C2



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 1/4 RL

INPUT CURRENT

V1 DC CURRENT

V2 REF RL

V3

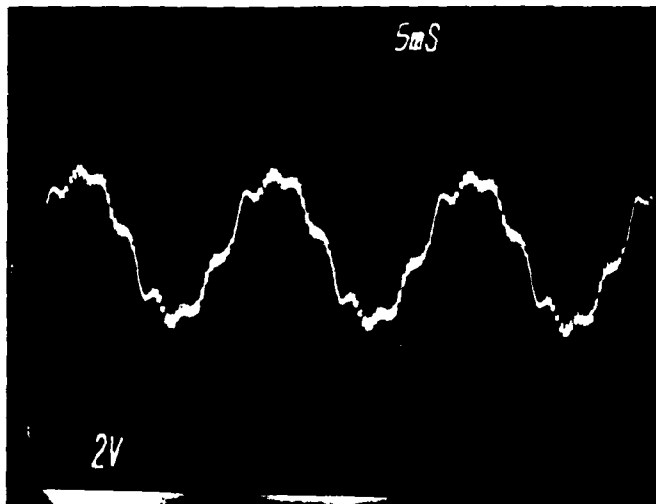
V4 100/DIV REF RL

H1 200Hz 1DIV

H2

TEST NO. 1B

PIX NO. 1BC



V1 AC CURRENT 20A/DIV

V2

V3

V4

H1 5ms/DIV

H2

TEST NO.

PIX NO. 1BAC

V1

V2

V3

V4

H1

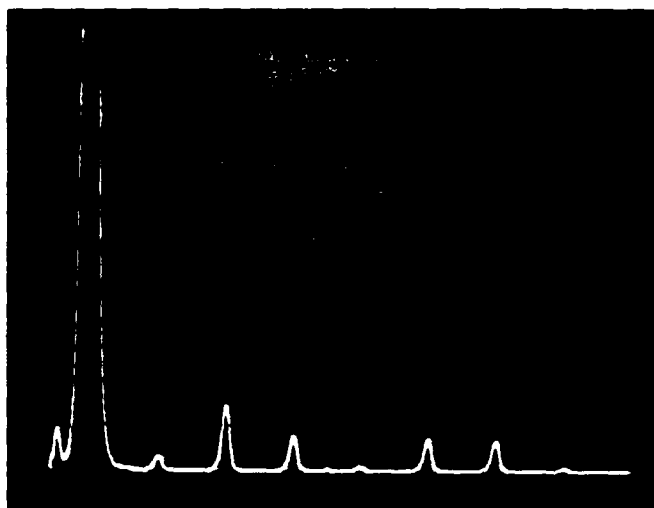
H2

TEST NO.

PIX NO.



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 1/4 RL

V1 V ϕ A 100/DIV

V2 _____

V3 _____

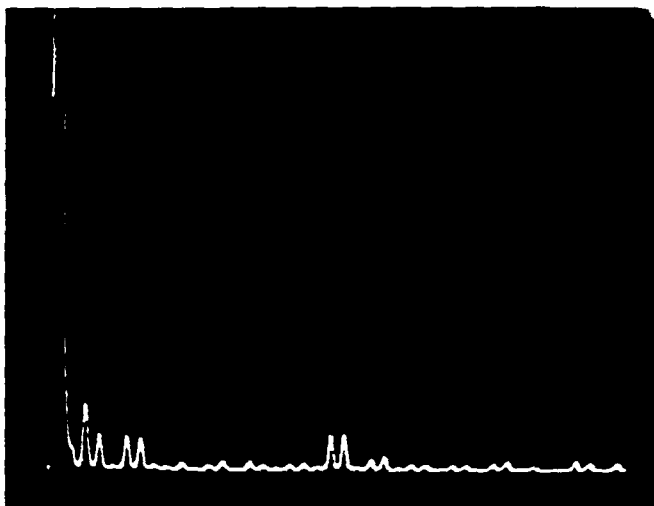
V4 _____

H1 100Hz 1/DIV

H2 _____

TEST NO. 1B

PIX NO. 1B7d1



V1 _____

V2 _____

V3 _____

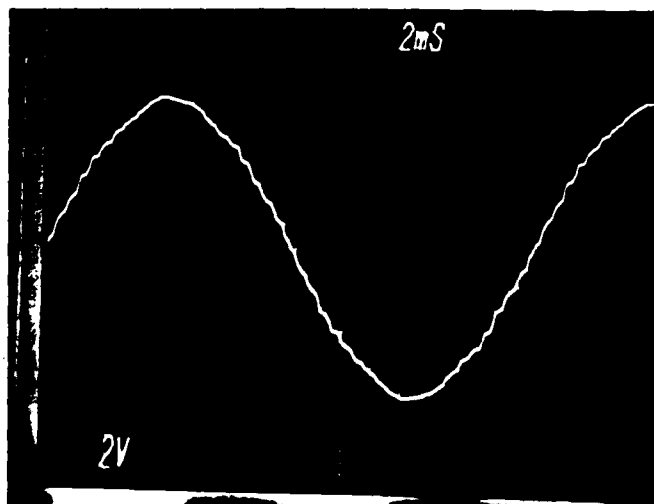
V4 _____

H1 _____

H2 _____

TEST NO. 1B

PIX NO. 1B7d2



V1 V ϕ A

V2 _____

V3 _____

V4 _____

H1 _____

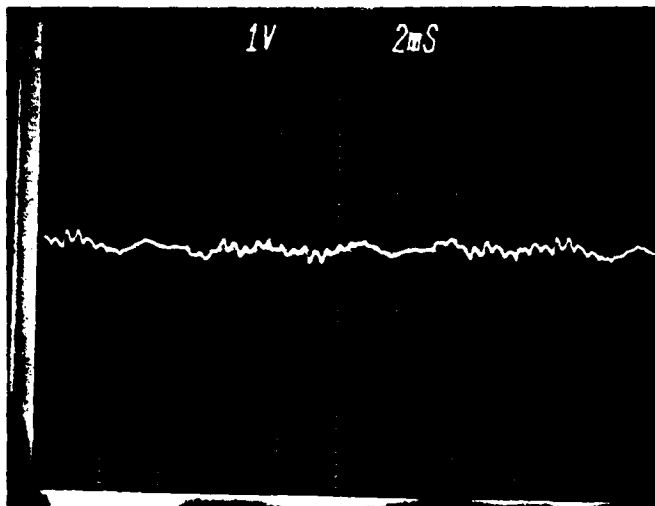
H2 _____

TEST NO. 1B

PIX NO. 1B7a



SANTA BARBARA, CALIFORNIA

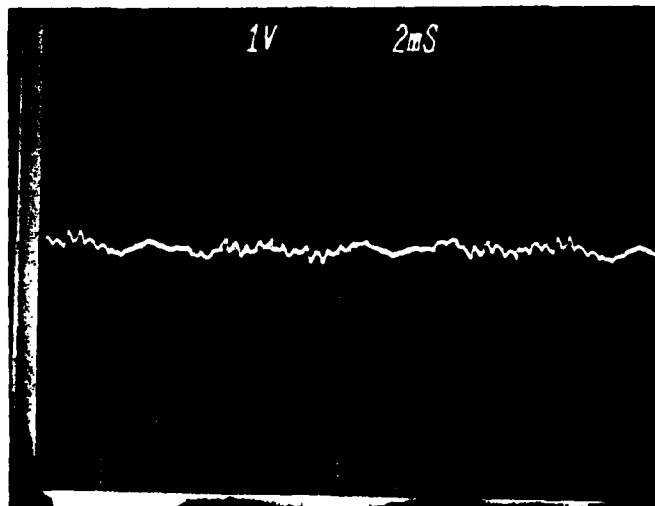


TEST DESCRIPTION 60Hz 1/4 RL
DEVIATION

V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1B

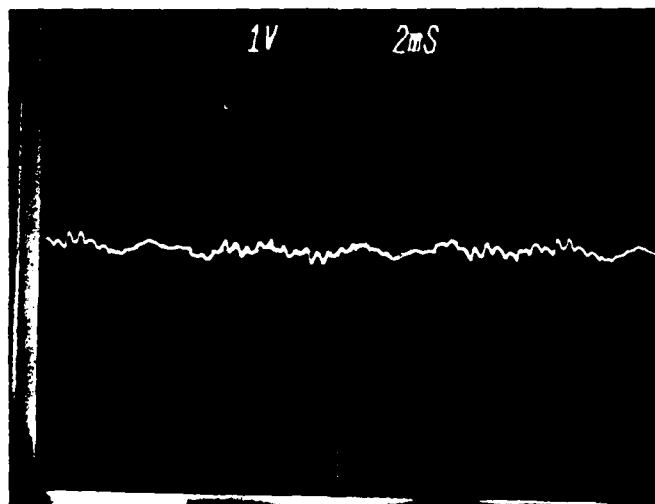
PIX NO. 1B7g



V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1B

PIX NO. 1B7h



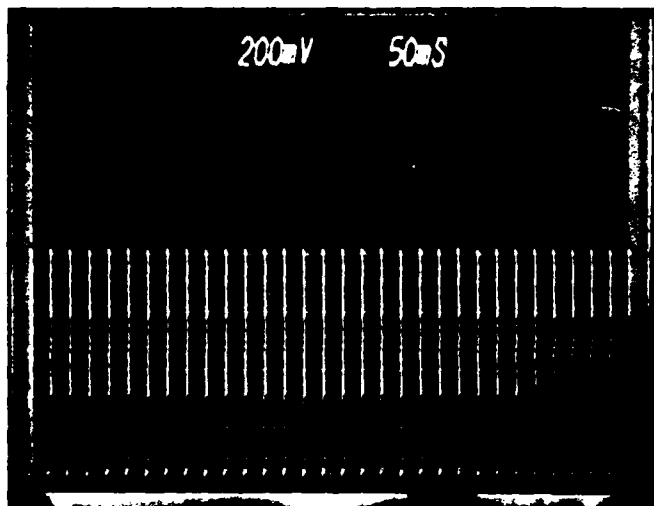
V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1B

PIX NO. 1B7i



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60 Hz 1/4 RL
AMPLITUDE MODULATION
& DEVIATION

V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1B
PIX NO. 1B7j



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1B
PIX NO. 1B7k

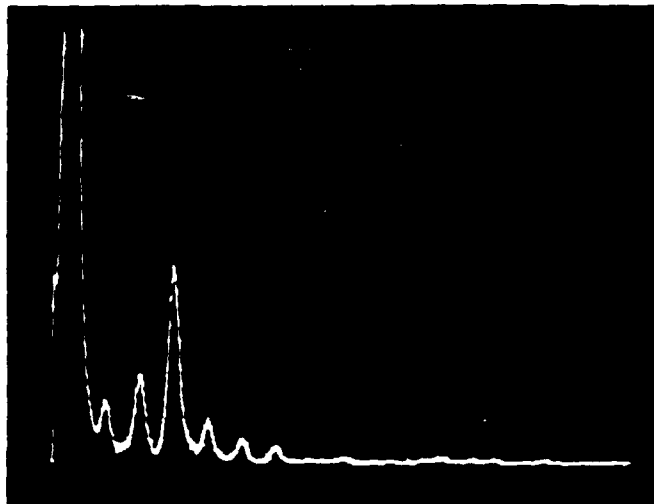


V1 V ϕ C 5 ϕ /DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1B
PIX NO. 1B7i 2



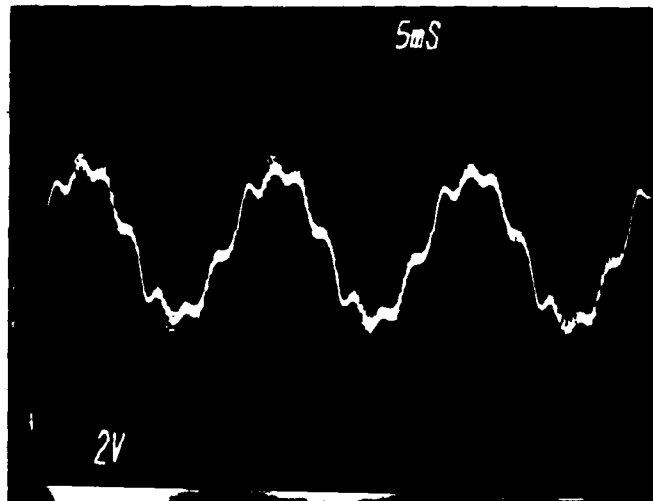
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 1/4 FL
INPUT CURRENT

V1 ΦC CURRENT
V2 REF RL
V3 10% / DIV REF RL
V4 _____
H1 200Hz / DIV
H2 _____

TEST NO. 1C
PIX NO. 1CC



V1 ΦC CURRENT @ 20A / DIV
V2 _____
V3 _____
V4 _____
H1 5ms / DIV
H2 _____

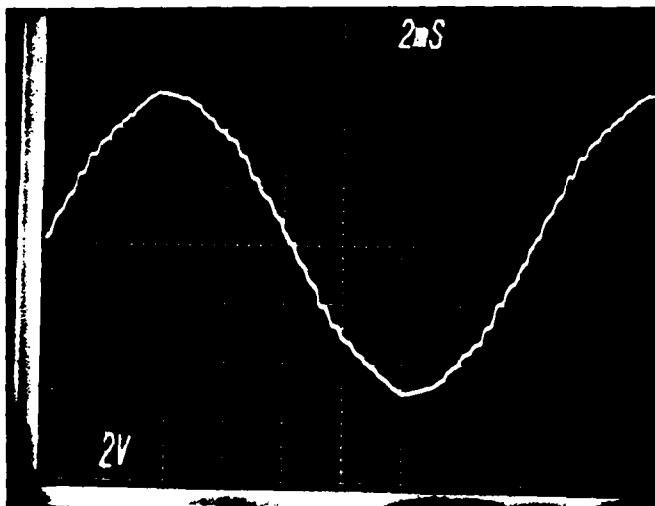
TEST NO. 1C
PIX NO. 1CAC

V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. _____
PIX NO. _____



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 1/4 FL

V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1C

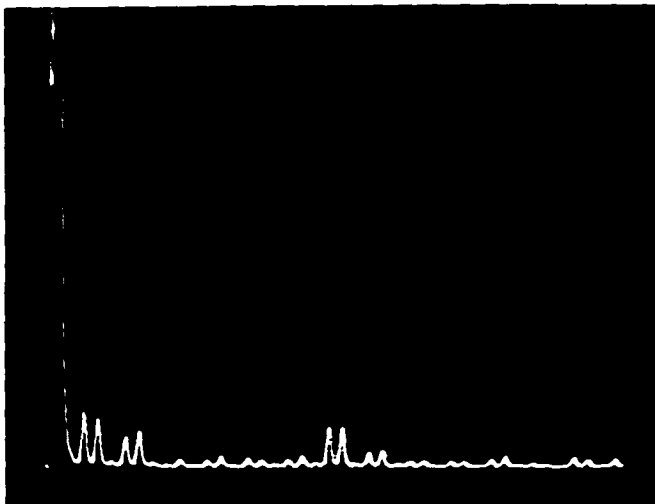
PIX NO. 1C7a



V1 V ϕ A 100/DIV
V2 _____
V3 _____
V4 _____
H1 100Hz/DIV
H2 _____

TEST NO. 1C

PIX NO. 1C7d1



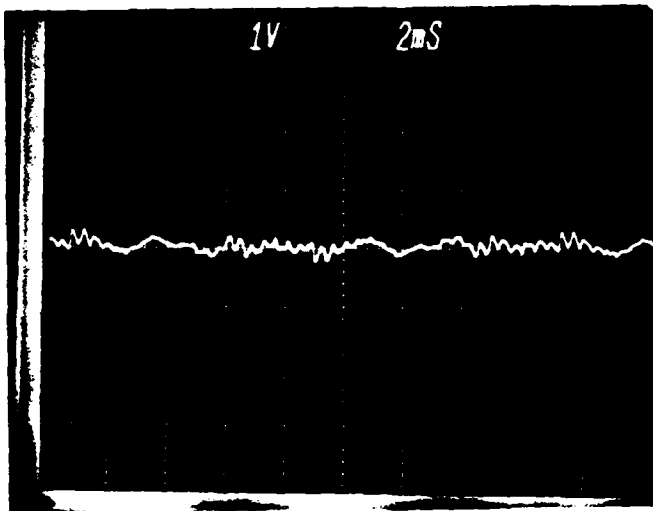
V1 V ϕ A 100/DIV
V2 _____
V3 _____
V4 _____
H1 500Hz/DIV
H2 _____

TEST NO. 1C

PIX NO. 1C7d2



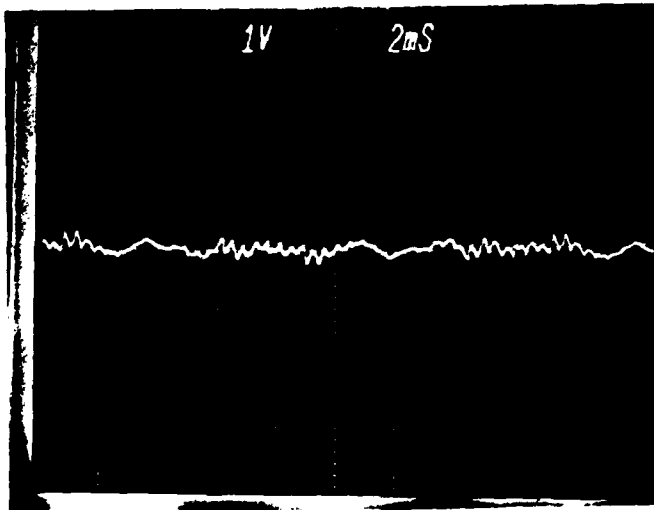
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 1/4FL
DEVIATION

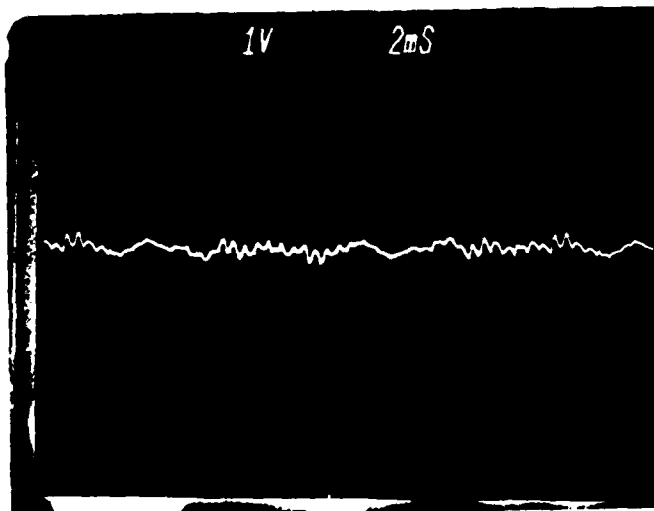
V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1C
PIX NO. 1C7g



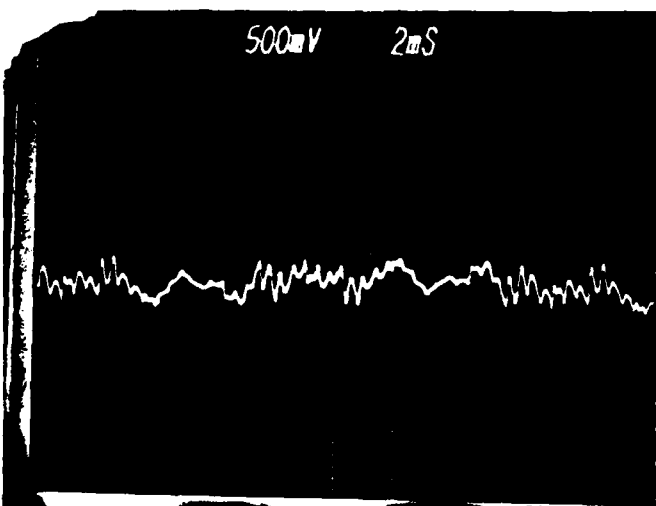
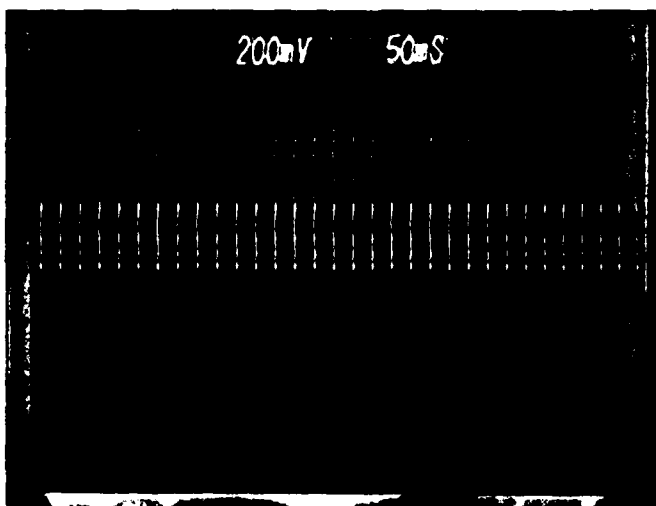
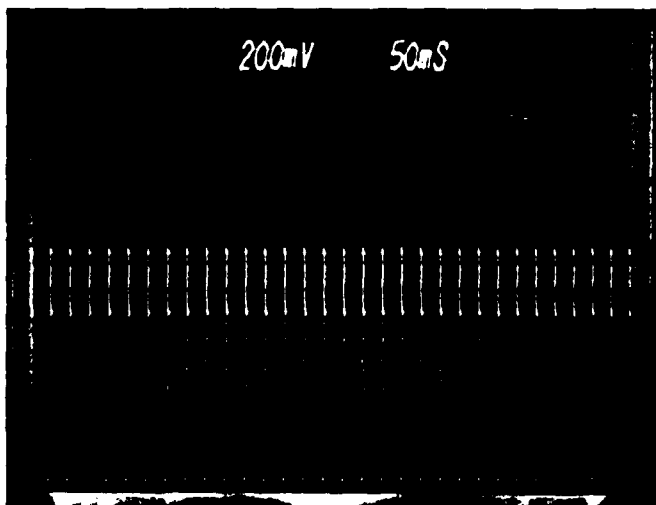
V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1C
PIX NO. 1C7h



V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1C
PIX NO. 1C7i



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 60Hz 1/4 FL
V MOD

V1 VφA
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1C
PIX NO. 1C7j

V1 VφA
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

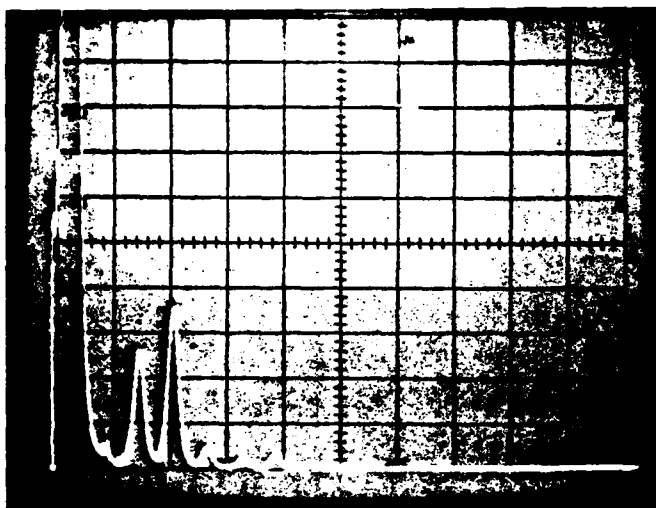
TEST NO. 1C
PIX NO. 1C7K

V1 VφC 590/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1C
PIX NO. 1C7L2



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 1/2 RL

INPUT CURRENT

V1 DC INPUT CURRENT

V2 REF RL

V3 170/DIV

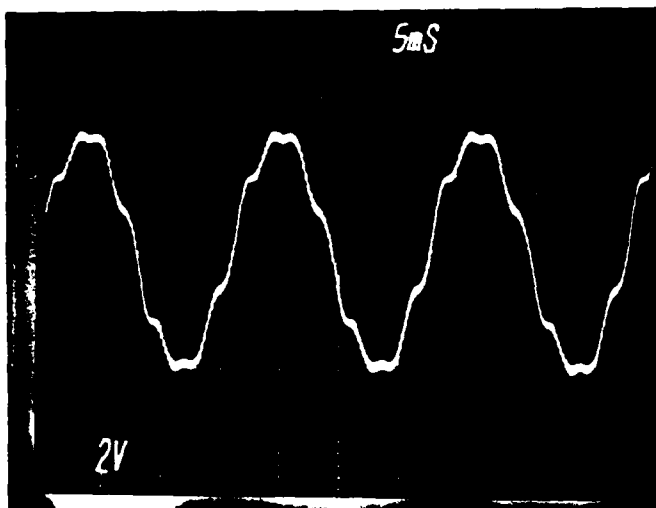
V4

H1 200Hz/DIV

H2

TEST NO. 1D

PIX NO. 1D5F



V1 DC CURRENT @ 20A/DIV

V2

V3

V4

H1 5ms/DIV

H2

TEST NO. 1D

PIX NO. 1D5C

V1

V2

V3

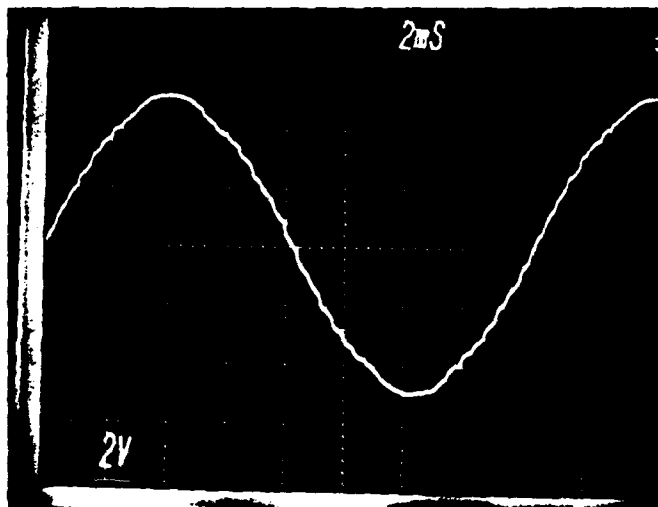
V4

H1

H2

TEST NO.

PIX NO.

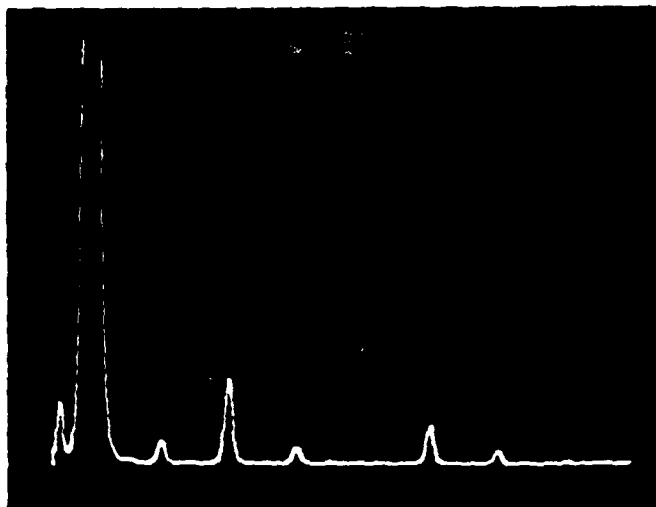


SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 60Hz 1/2 RL

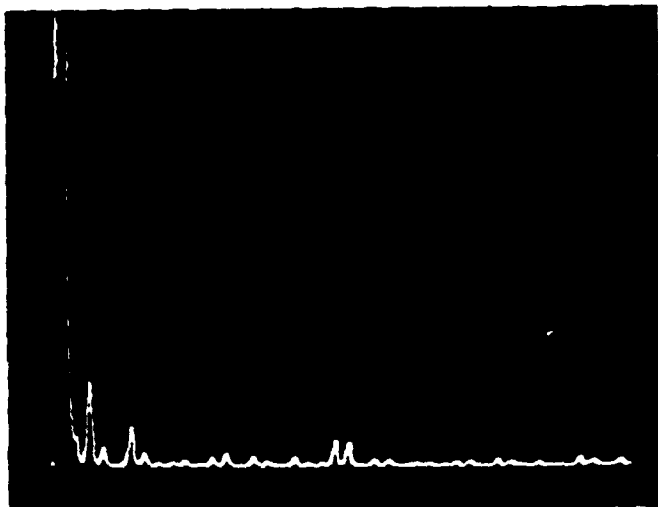
V1 V ϕ A
 V2 _____
 V3 _____
 V4 _____
 H1 2MS/DIV
 H2 _____

TEST NO. 1D
 PIX NO. 1D7a



V1 V ϕ A 100/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 100Hz/DIV
 H2 _____

TEST NO. 1D
 PIX NO. 1D7d1

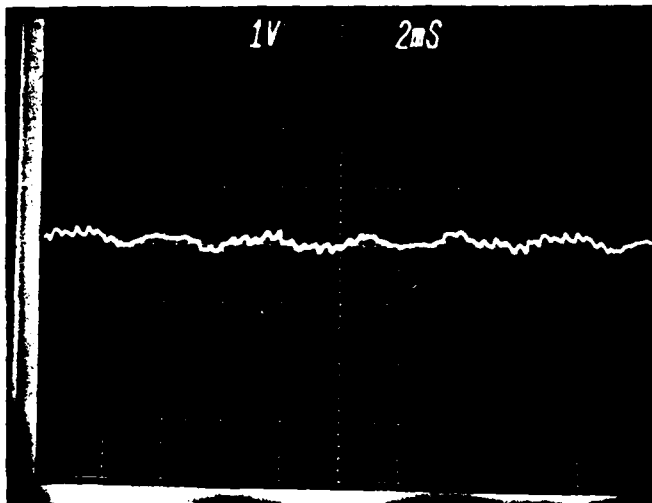


V1 V ϕ A 100/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 500Hz/DIV
 H2 _____

TEST NO. 1D
 PIX NO. 1D7d2



SANTA BARBARA, CALIFORNIA

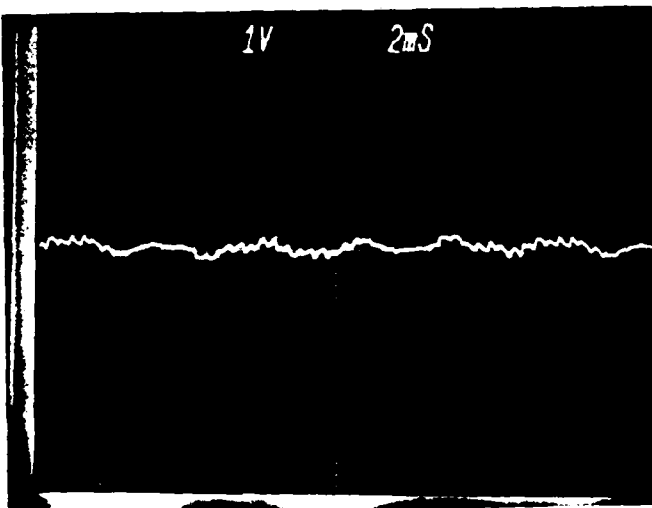


TEST DESCRIPTION 60Hz 1/2 RL
DEVIATION

V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1D

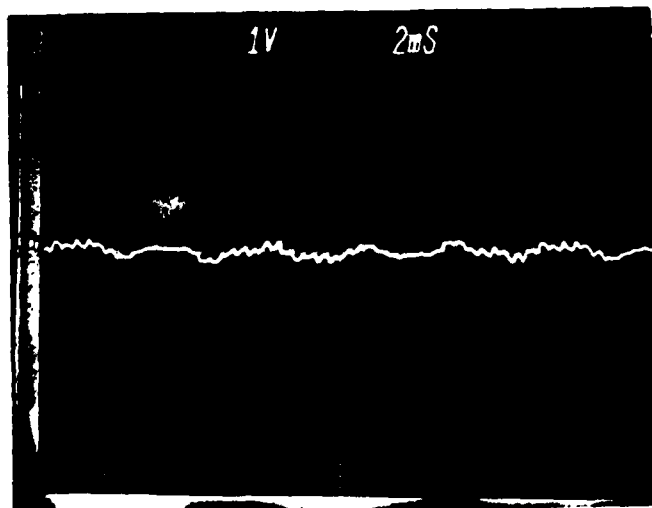
PIX NO. 1D7g



V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1D

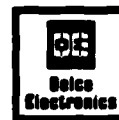
PIX NO. 1D7h



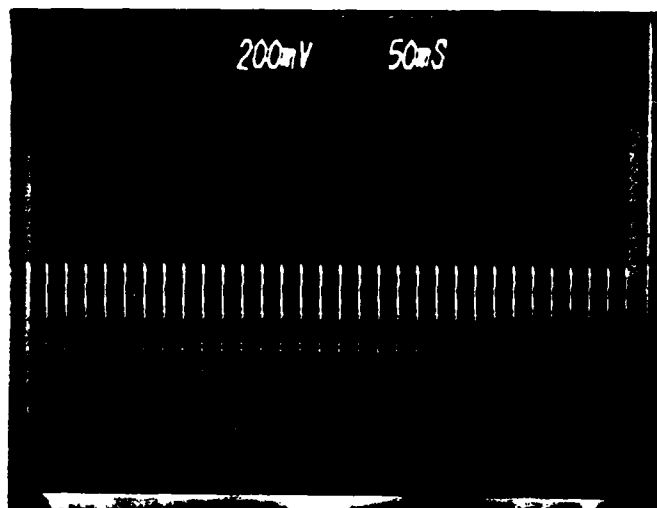
V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1D

PIX NO. 1D7i



SANTA BARBARA, CALIFORNIA

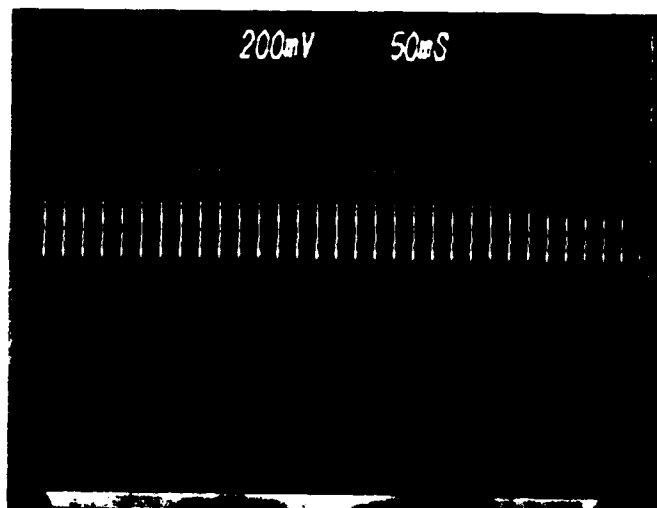


TEST DESCRIPTION 60Hz 1/2 RL
V MOD

V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1D

PIX NO. 1D7j



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1D

PIX NO. 1D7K



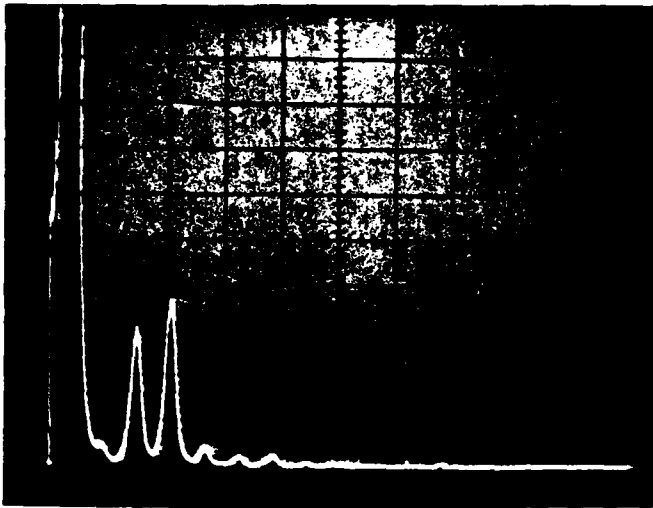
V1 V ϕ C 590/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1D

PIX NO. 1D7L2



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 6012 1/2 FL
INPUT CURRENT

V1 DC INPUT CURRENT

V2 REF RL 100/DIV

V3 _____

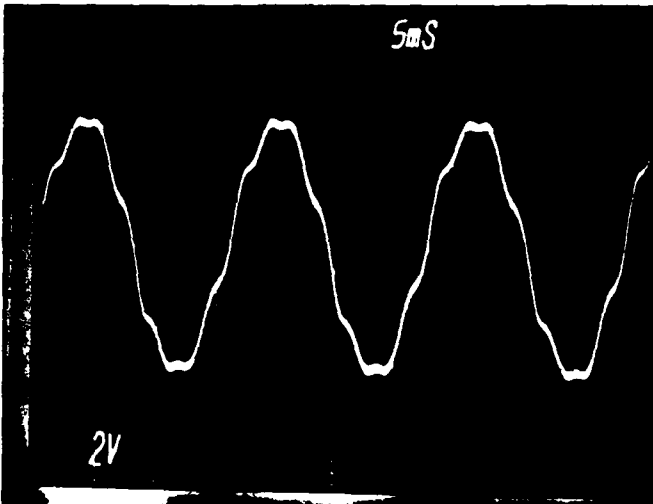
V4 _____

H1 200HZ/DIV

H2 _____

TEST NO. 1E

PIX NO. 1ESP



V1 DC CURRENT @ 20A/DIV

V2 _____

V3 _____

V4 _____

H1 5MS/DIV

H2 _____

TEST NO. 1E

PIX NO. 1ESC

V1 _____

V2 _____

V3 _____

V4 _____

H1 _____

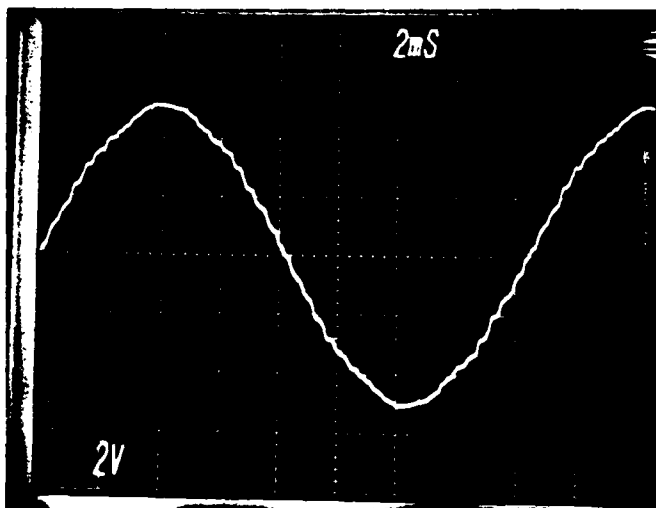
H2 _____

TEST NO. _____

PIX NO. _____



SANTA BARBARA, CALIFORNIA

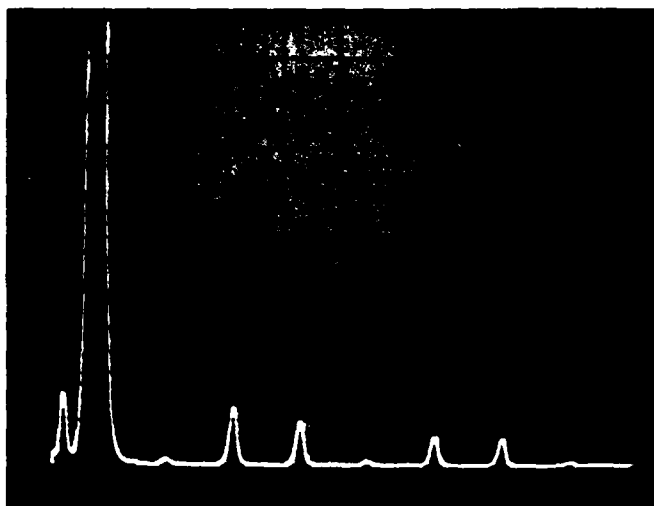


TEST DESCRIPTION 60Hz 1/2RL

V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1E

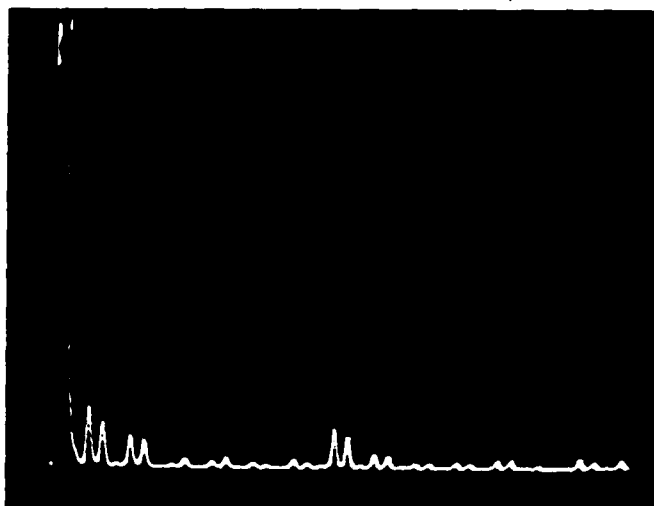
PIX NO. 1E7a



V1 V ϕ A 170/DIV
V2 _____
V3 _____
V4 _____
H1 100Hz/DIV
H2 _____

TEST NO. 1E

PIX NO. 1E7d1



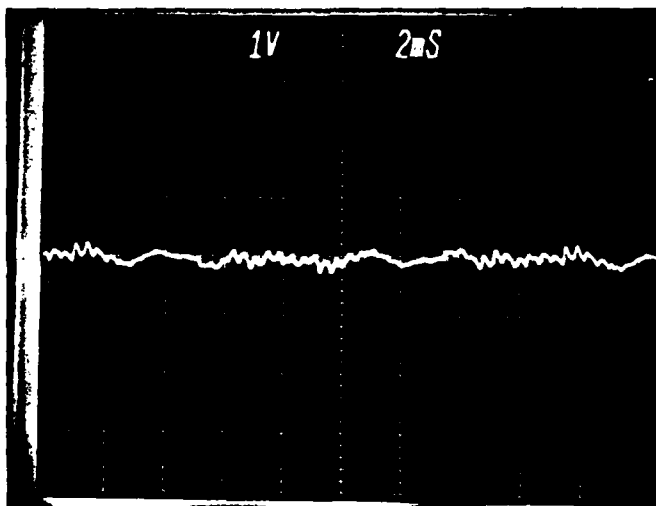
V1 V ϕ A 170/DIV
V2 _____
V3 _____
V4 _____
H1 500Hz/DIV
H2 _____

TEST NO. 1E

PIX NO. 1E7d2



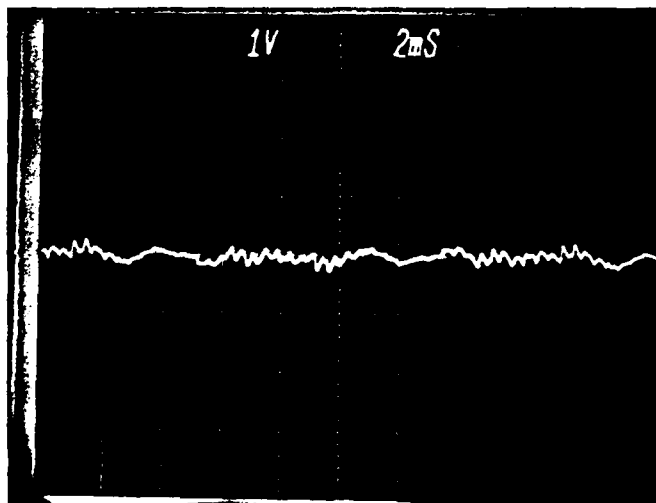
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 1/2 FL
DEVIATION

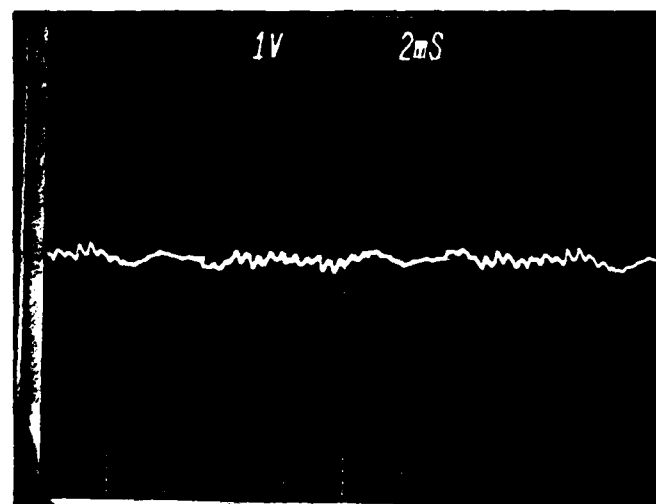
V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1E
PIX NO. 1E7g



V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1E
PIX NO. 1E7h

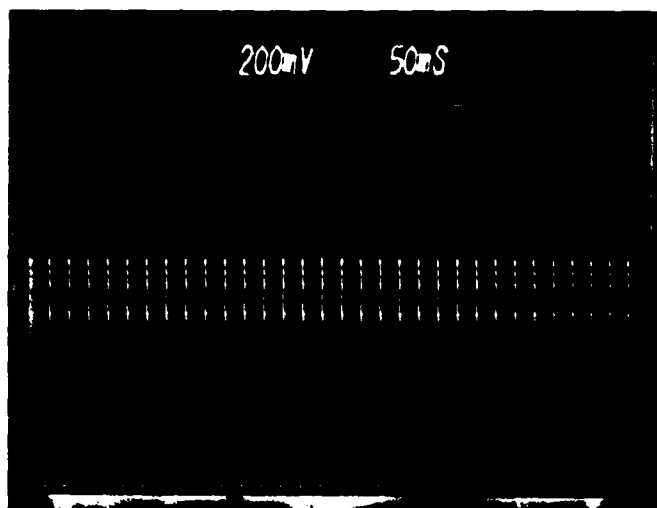


V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1E
PIX NO. 1E7i



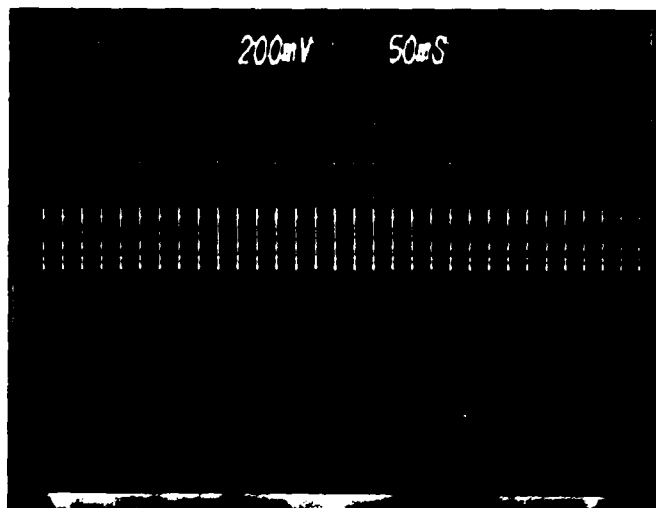
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 1/2 FI
V MOD

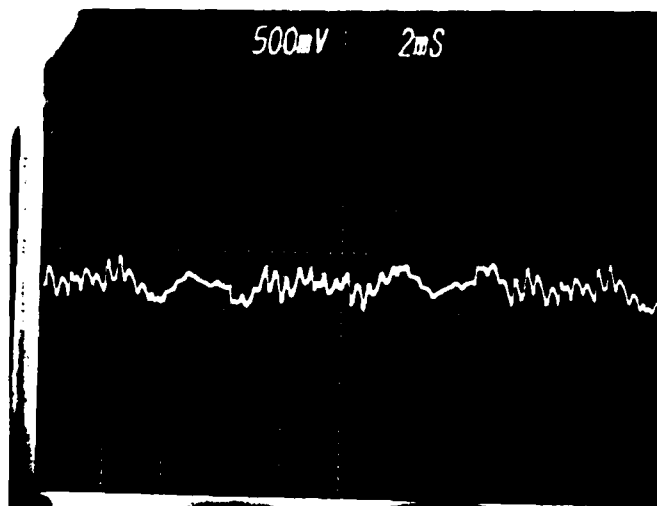
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1E
PIX NO. 1E7j



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1E
PIX NO. 1E7k

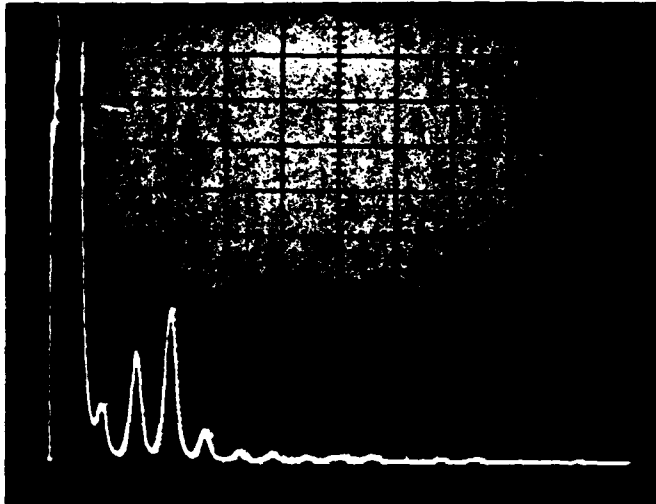


V1 V ϕ C 5% DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1E
PIX NO. 1E7l 2



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 3/4 RL

INPUT CURRENT

V1 dB INPUT CURRENT

V2 REF RL

V3 1000 / DIV

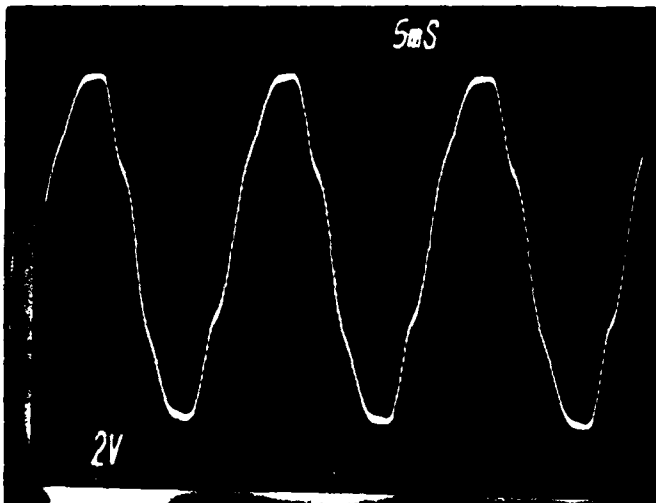
V4

H1 200Hz / DIV

H2

TEST NO. IF

PIX NO. 1F54



V1 dB INPUT CURRENT

V2 @ 20A / DIV

V3

V4

H1 5ms / DIV

H2

TEST NO. IF

PIX NO. 1F56

V1

V2

V3

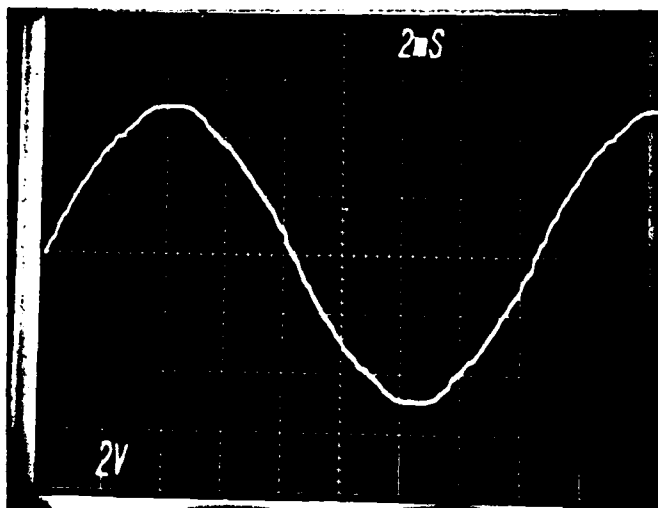
V4

H1

H2

TEST NO.

PIX NO.

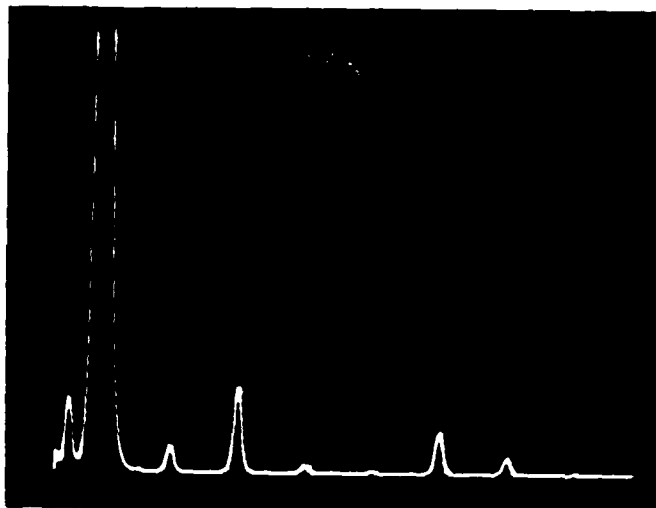


SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION IF 60Hz 3/4 RL

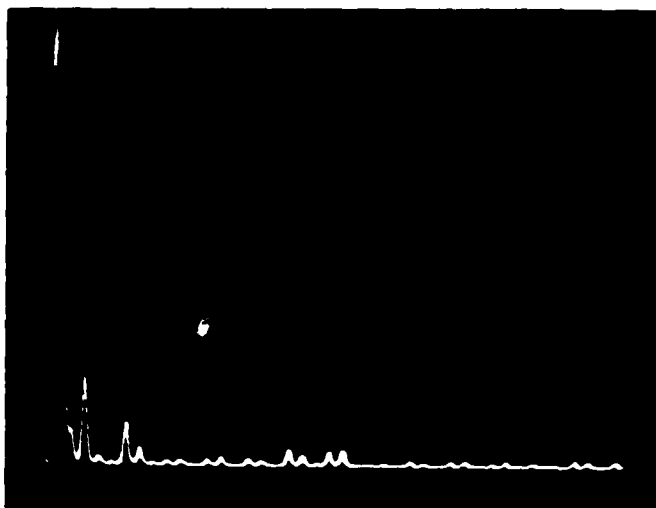
V1 V ϕ A
 V2 _____
 V3 _____
 V4 _____
 H1 _____
 H2 _____

TEST NO. IF
 PIX NO. IF7a



V1 V ϕ A 100mV/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 100Hz/DIV
 H2 _____

TEST NO. IF
 PIX NO. IF7d1

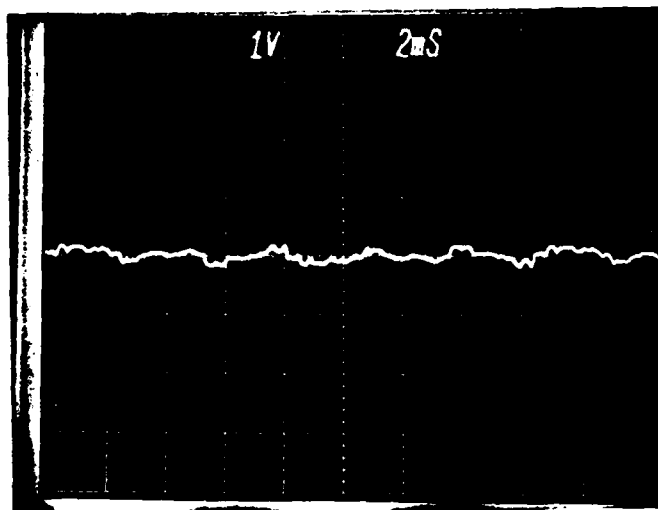


V1 V ϕ A 100mV/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 500Hz/DIV
 H2 _____

TEST NO. IF
 PIX NO. IF7d2



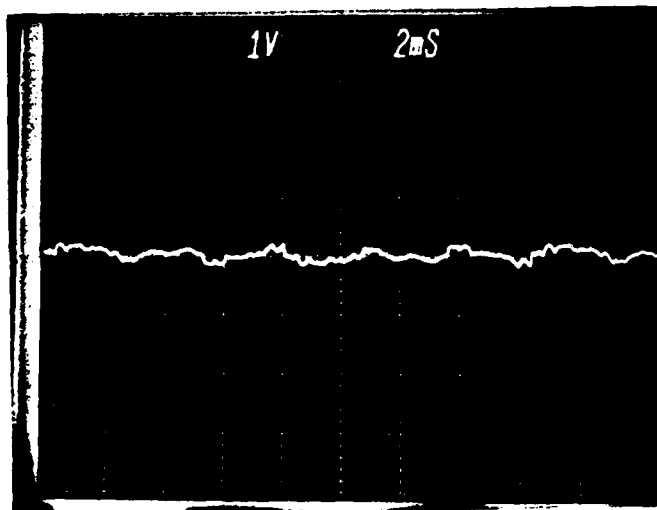
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION IF 60Hz 3/4 RL
DEVIATION

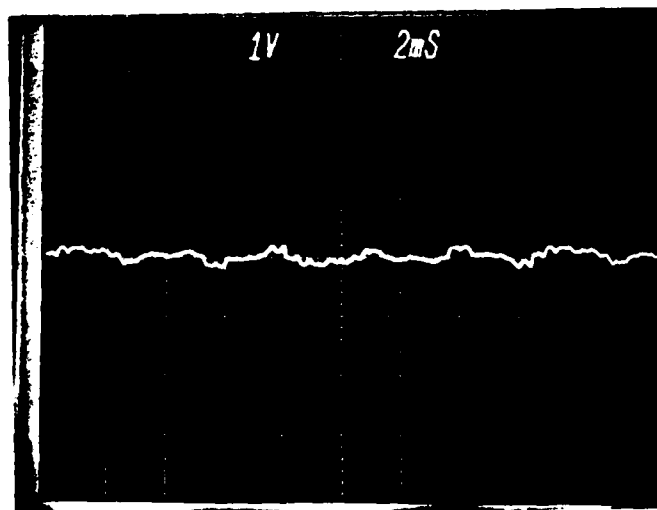
V1 V ϕ A 1090/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IF
PIX NO. IF7g



V1 V ϕ B 1090/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IF
PIX NO. IF7h

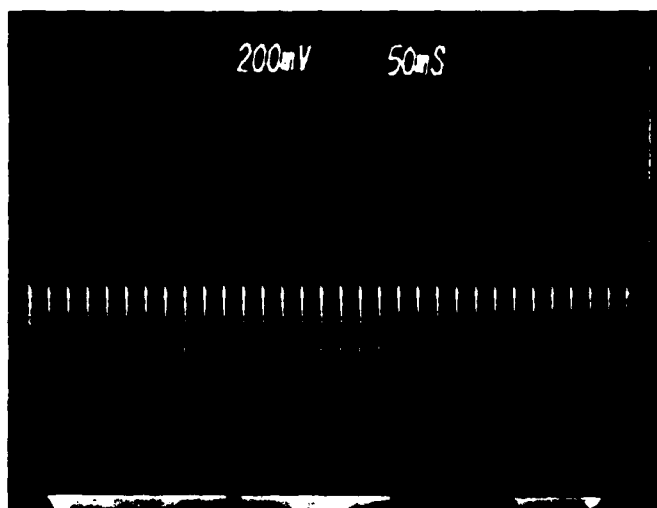


V1 V ϕ C 1090/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IF
PIX NO. IF7i



SANTA BARBARA, CALIFORNIA

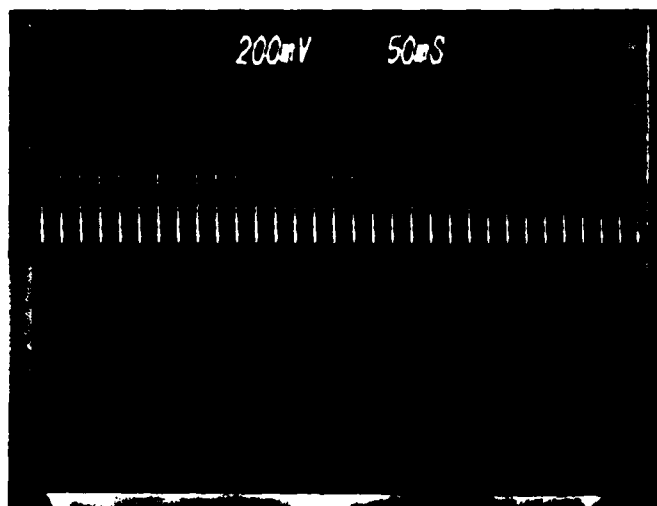


TEST DESCRIPTION IF 60Hz 3/4 RL
V MOD & DEVIATION

V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IF

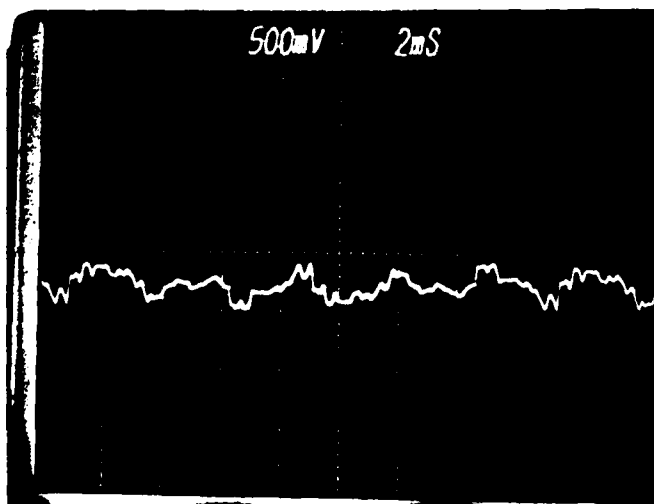
PIX NO. IF7j



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IF

PIX NO. IF7K



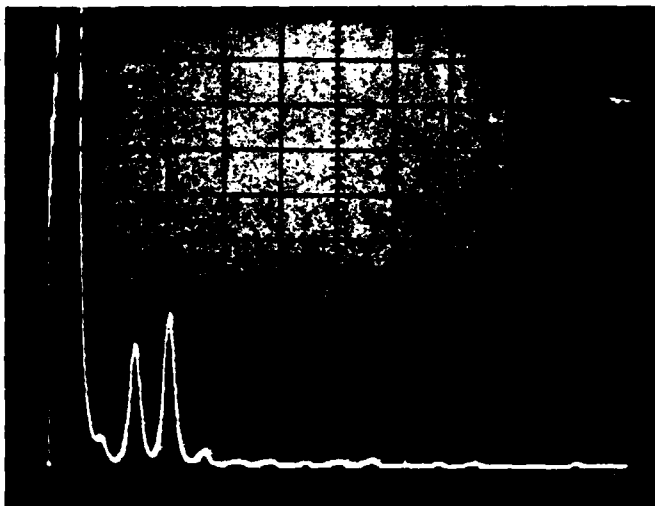
V1 V ϕ C 590/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IF

PIX NO. IF7L2



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60HZ 3/4 FL

INPUT CURRENT

V1 DC CURRENT

V2 REF RL

V3 100/DIV

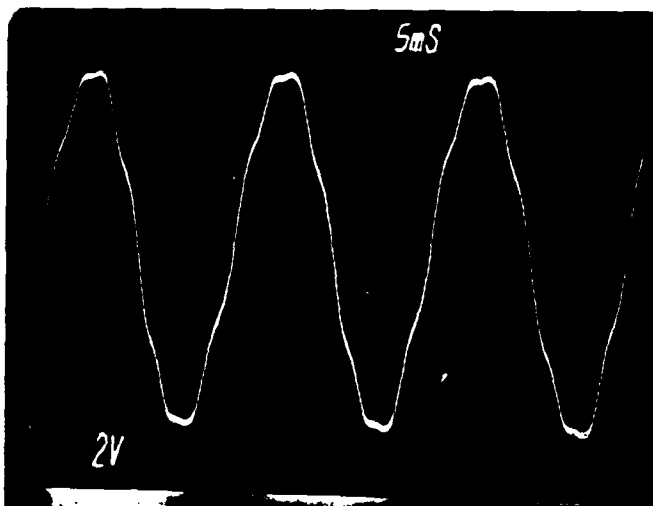
V4

H1 200 HZ / DIV

H2

TEST NO. 1G

PIX NO. 1G5F



V1 DC INPUT CURRENT

V2 @ 20A/DIV

V3

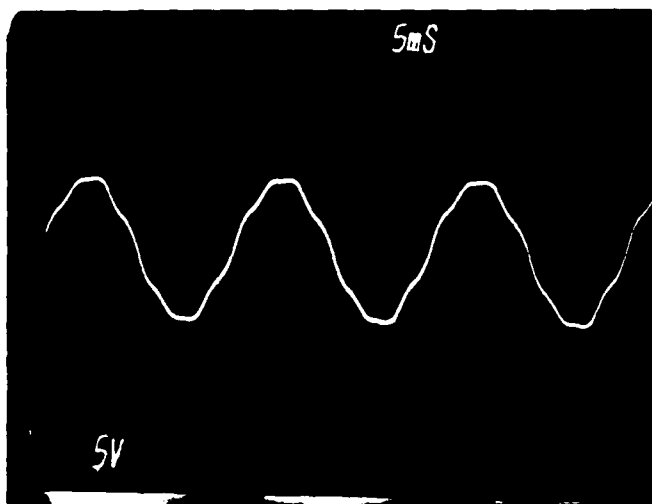
V4

H1 5MS / DIV

H2

TEST NO. 1G

PIX NO. 1G5C



V1 DC INPUT CURRENT

V2 @ 50A/DIV

V3

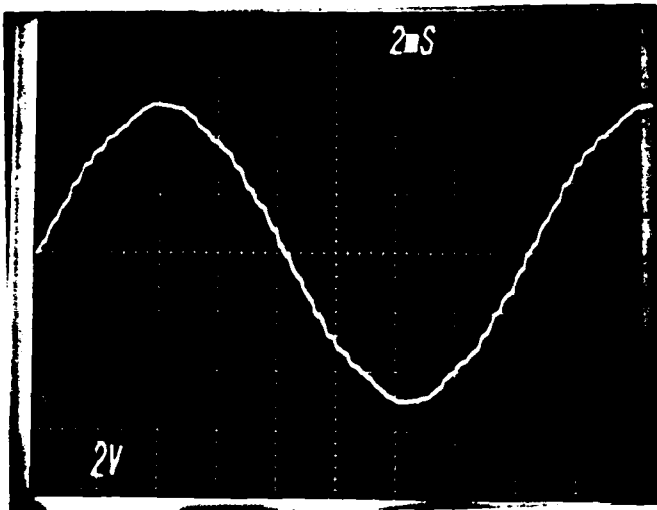
V4

H1 5MS / DIV

H2

TEST NO. 1G

PIX NO. 1G5C

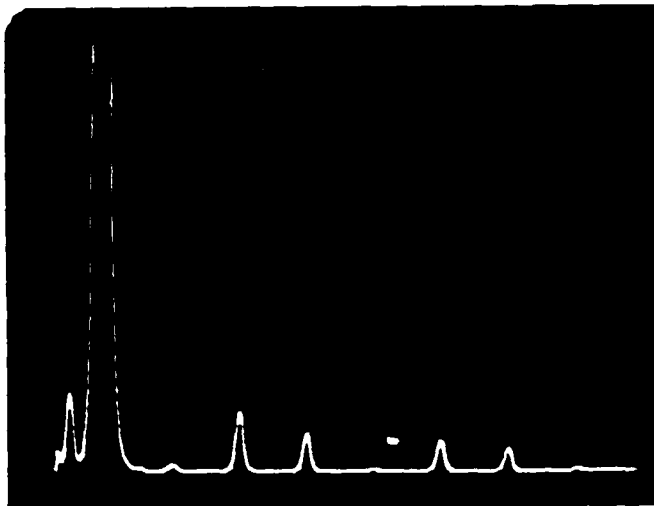


SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 60Hz 3/4FL

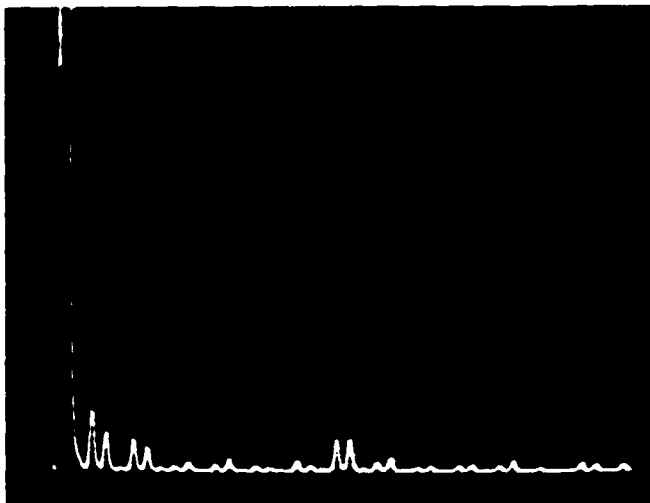
V1 V ϕ A
 V2 _____
 V3 _____
 V4 _____
 H1 _____
 H2 _____

TEST NO. 1G
 PIX NO. 1G7a



V1 V ϕ A 100/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 100Hz/DIV
 H2 _____

TEST NO. 1G
 PIX NO. 1G7d1

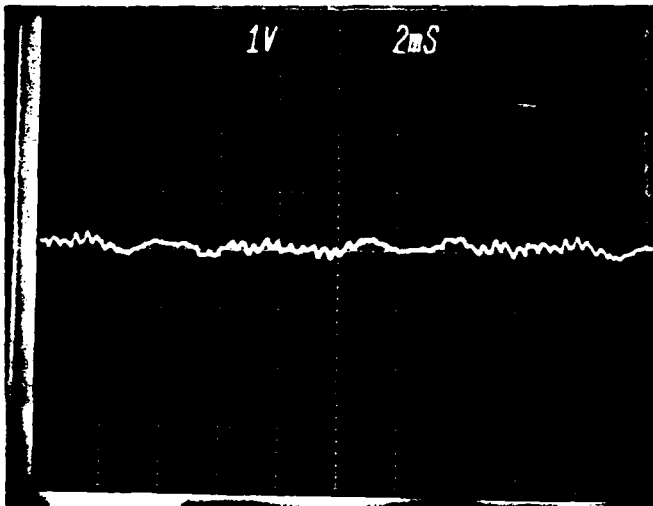


V1 V ϕ A 100/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 500Hz/DIV
 H2 _____

TEST NO. 1G
 PIX NO. 1G7d2



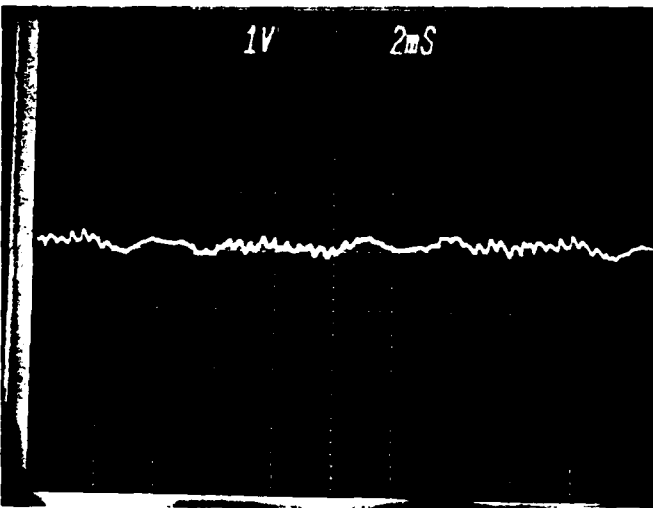
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 3/4 FL
DEVIATION

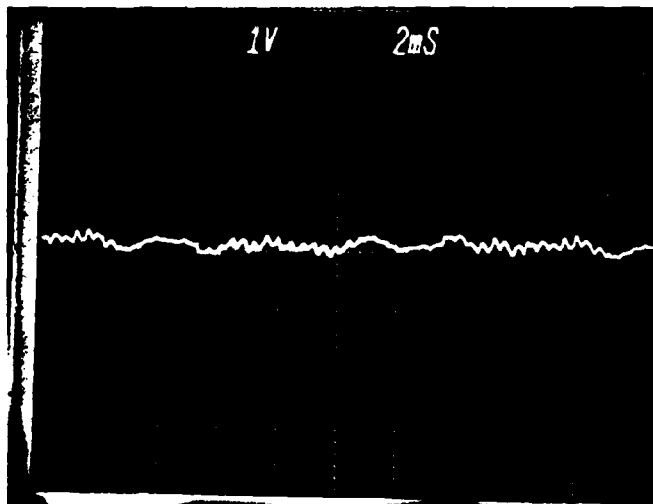
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IG
PIX NO. IG7g



V1 V ϕ B
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IG
PIX NO. IG7h

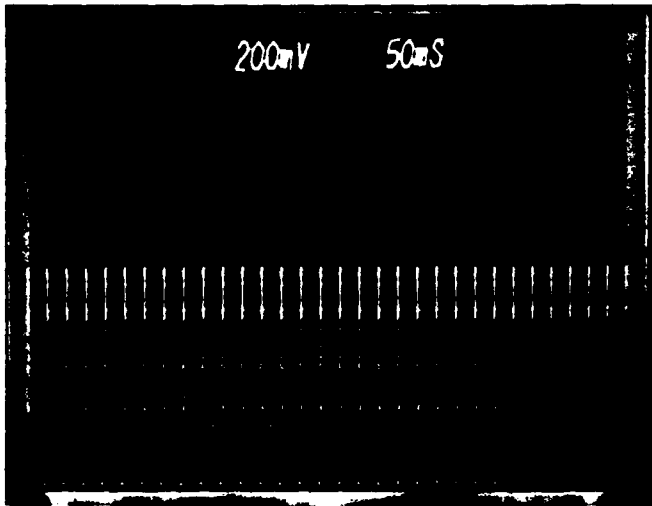


V1 V ϕ C
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IG
PIX NO. IG7i



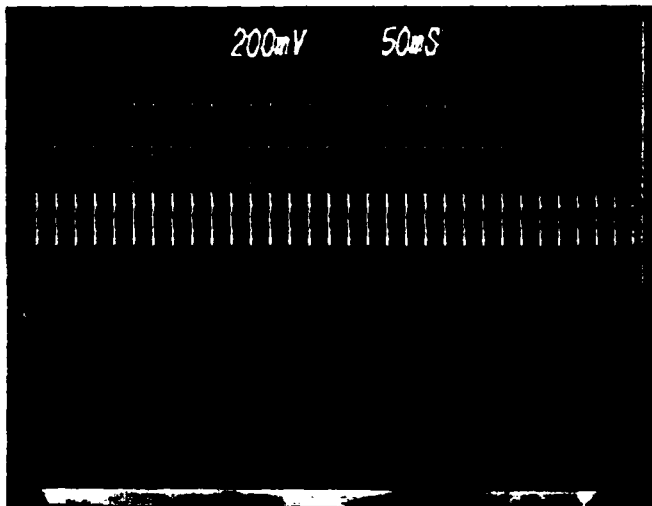
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz 3/4 FL
V MOD & DEVIATION

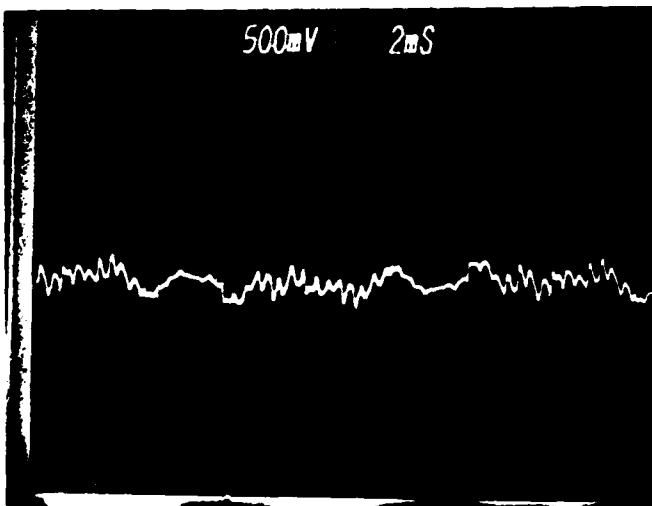
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IG
PIX NO. IG7j



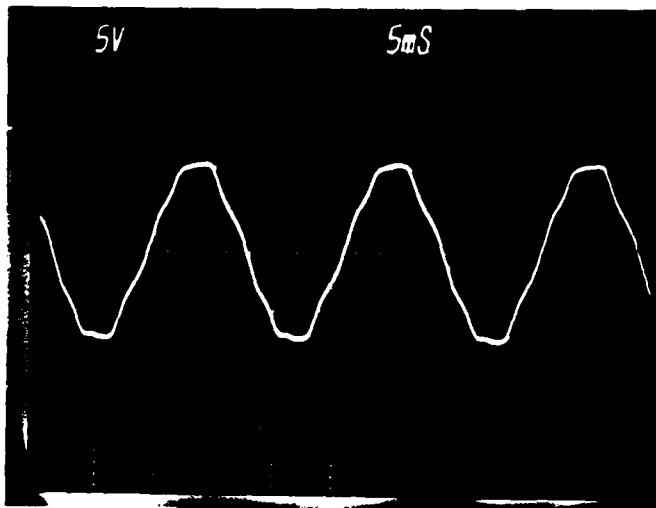
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IG
PIX NO. IG7k



V1 V ϕ C 50/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. KB
PIX NO. IG7L2



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION

V1 IΦA INPUT 50A/DIV

V2 (SPECTRUM PIX NO. 1HA1)

V3

V4

H1 5MS/DIV

H2

TEST NO.

PIX NO. 1Ha

V1

V2

V3

V4

H1

H2

TEST NO.

PIX NO.

V1

V2

V3

V4

H1

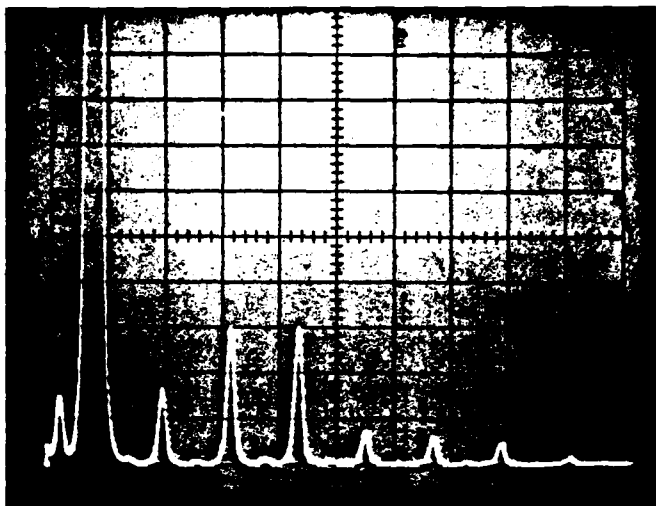
H2

TEST NO.

PIX NO.



SANTA BARBARA, CALIFORNIA

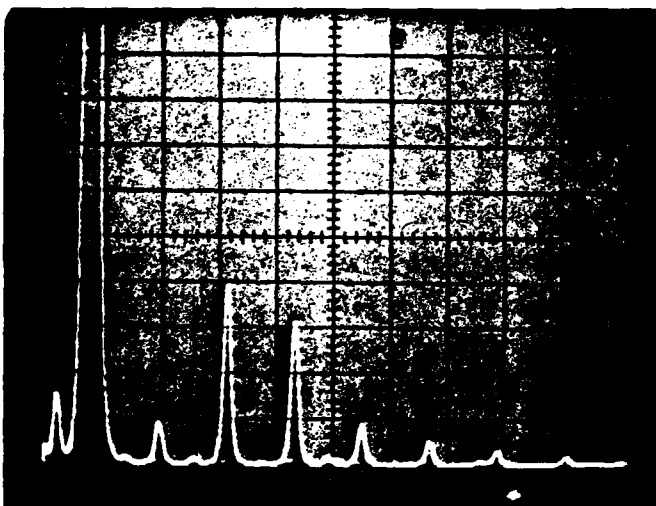


TEST DESCRIPTION _____

V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. _____

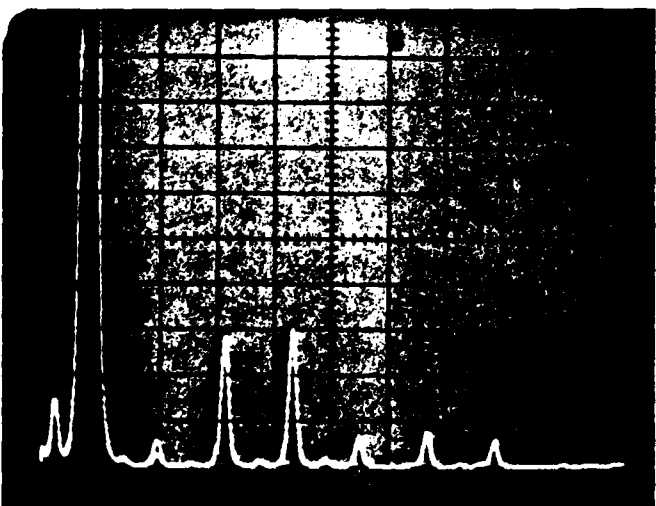
PIX NO. 1HA1



V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. _____

PIX NO. 1HB1



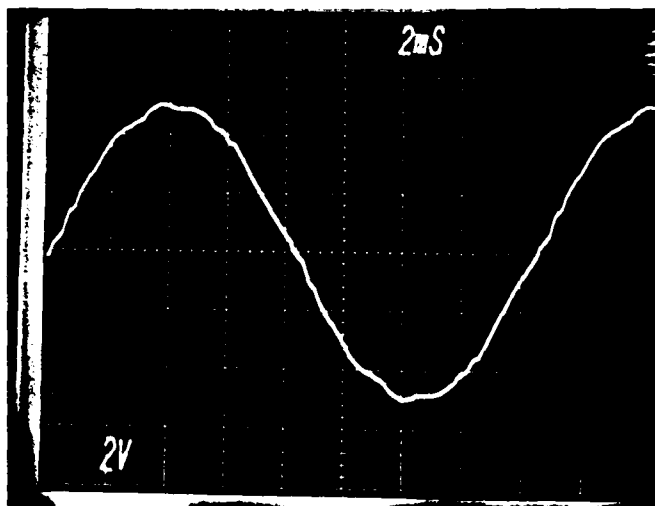
V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. _____

PIX NO. 1HC1



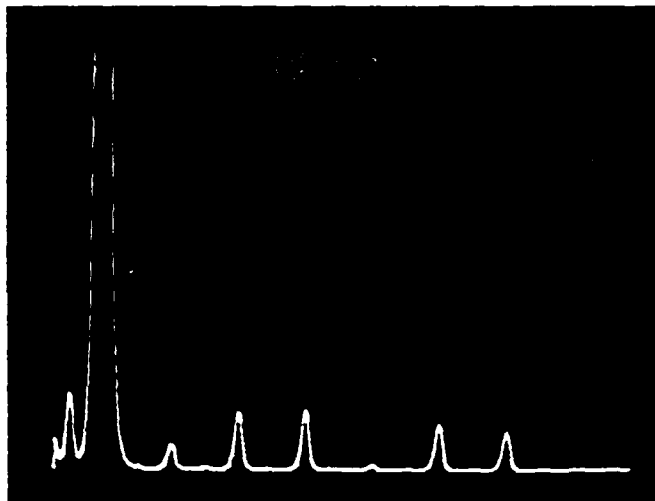
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 1H 60Hz RL

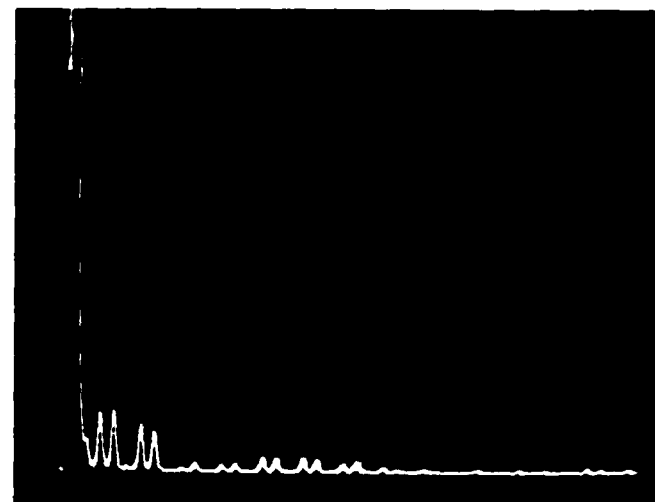
V1 V_{OA}
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1H
PIX NO. 1H7a



V1 V_{OA} 170/DIV
V2 _____
V3 _____
V4 _____
H1 100Hz/DIV
H2 _____

TEST NO. 1H
PIX NO. 1H7d1

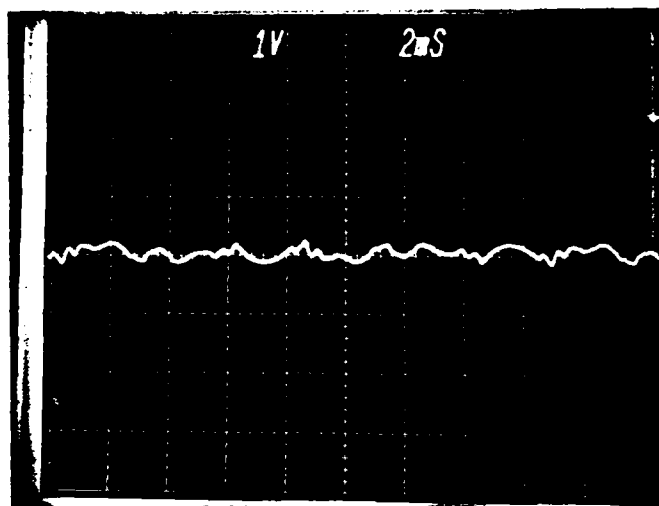


V1 V_{OA} 170/DIV
V2 _____
V3 _____
V4 _____
H1 500Hz/DIV
H2 _____

TEST NO. 1H
PIX NO. 1H7d2



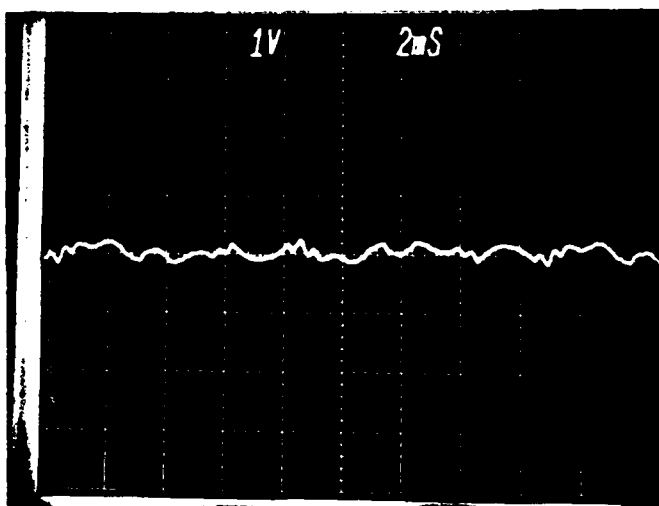
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 1H 60Hz RL
DEVIATION

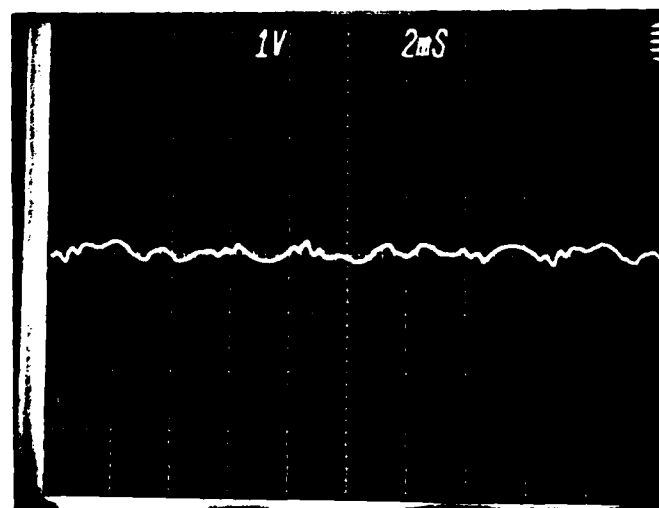
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1H
PIX NO. 1H7g



V1 V ϕ B
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1H
PIX NO. 1H7h1

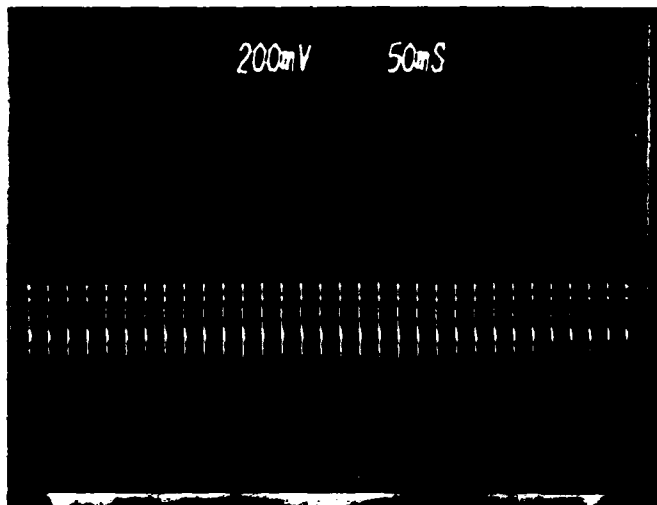


V1 V ϕ C
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1H
PIX NO. 1H7i



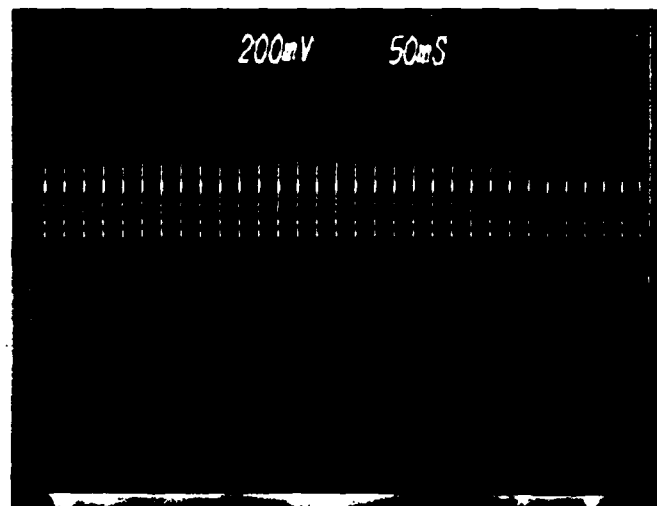
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 1H 60HZ RL
V MOD & DEVIATION

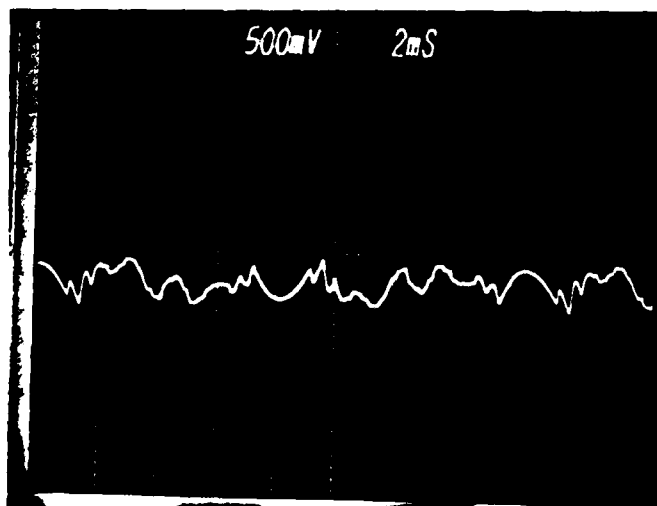
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1H
PIX NO. 1H7j



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1H
PIX NO. 1H7k

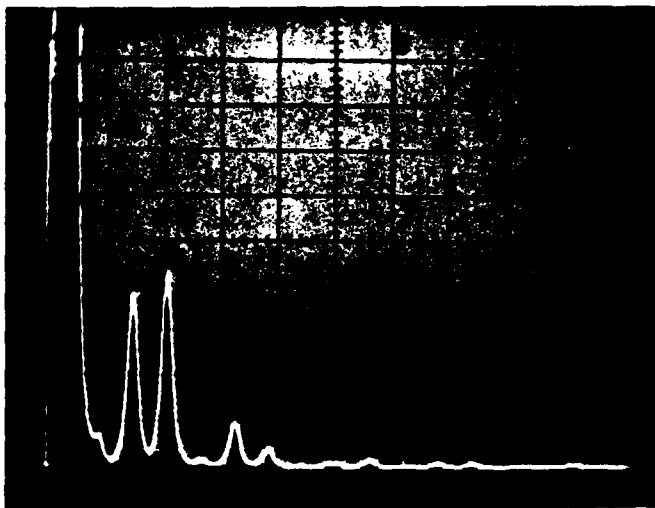


V1 V ϕ B 50 μ /DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1H
PIX NO. 1H7h2



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 60Hz FL
INPUT CURRENT

V1 DC INPUT CURRENT

V2 REF RL

V3 100/DIV

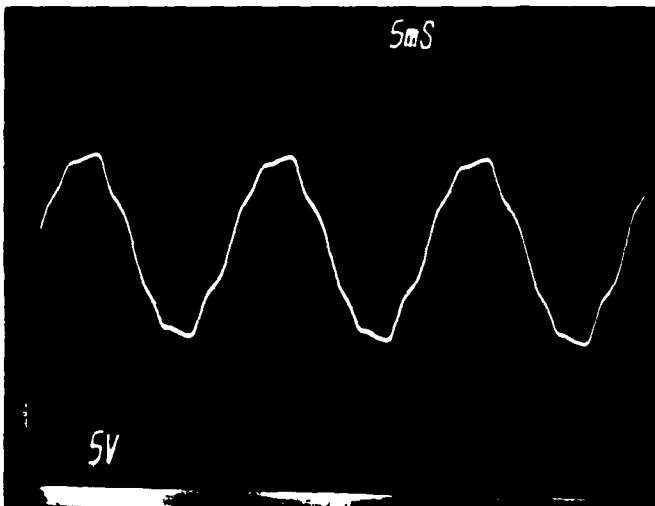
V4

H1 200 Hz/DIV

H2

TEST NO. 15

PIX NO. 155F



V1 DC INPUT CURRENT

V2 @ 50A/DIV

V3

V4

H1 5MS/DIV

H2

TEST NO. 15

PIX NO. 155C

V1

V2

V3

V4

H1

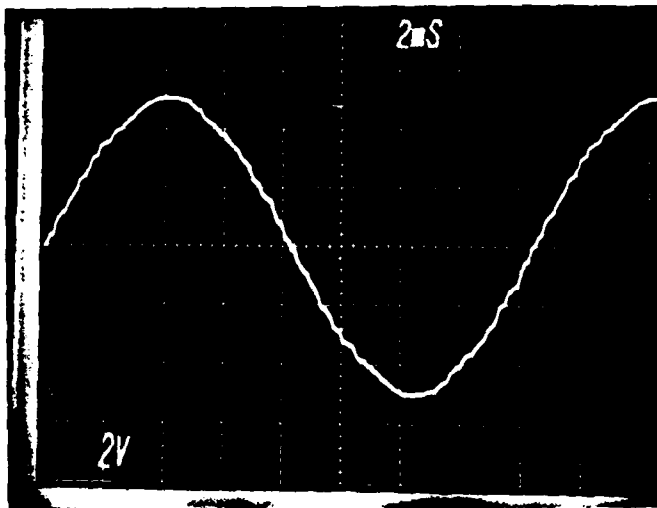
H2

TEST NO.

PIX NO.



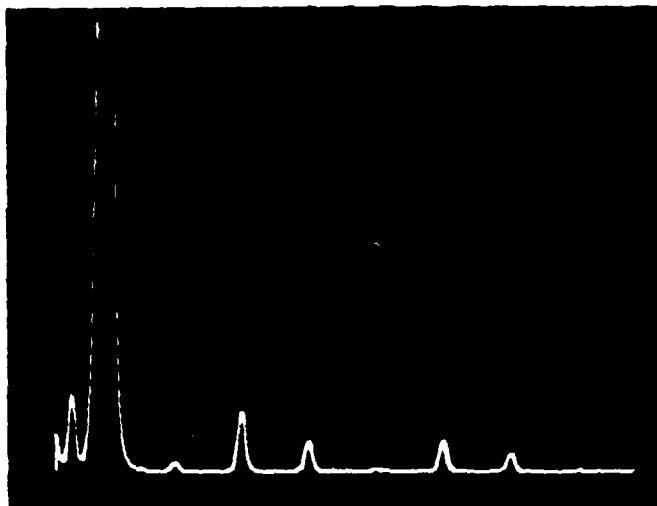
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 15 60Hz FL

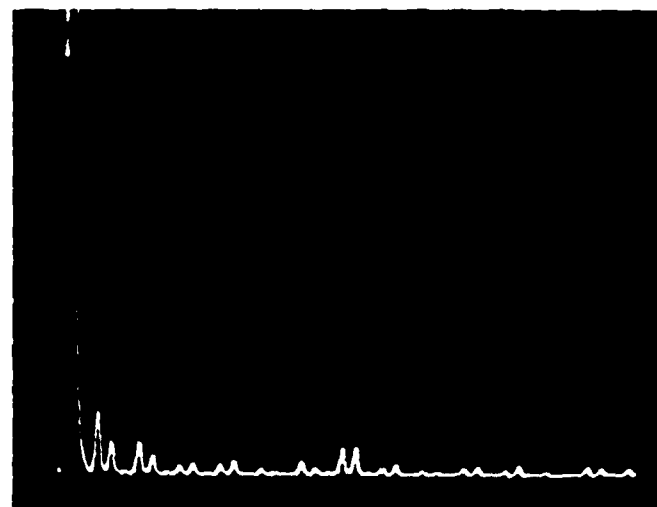
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 15
PIX NO. 157a



V1 V ϕ A 10V/DIV
V2 _____
V3 _____
V4 _____
H1 100Hz/DIV
H2 _____

TEST NO. 15
PIX NO. 157d1

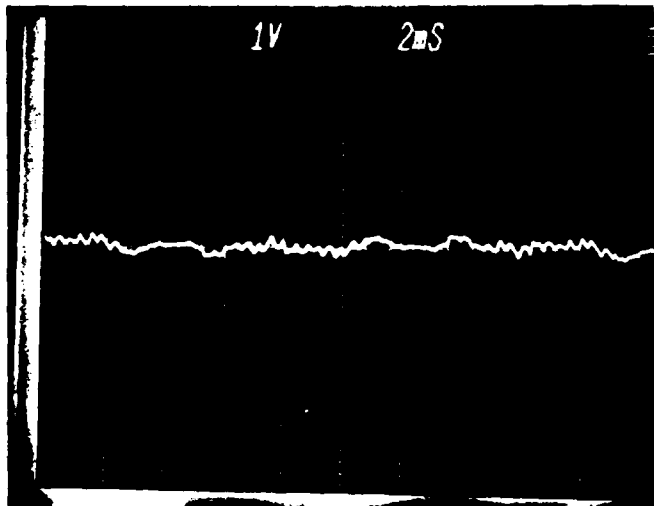


V1 V ϕ A 10V/DIV
V2 _____
V3 _____
V4 _____
H1 500Hz/DIV
H2 _____

TEST NO. 15
PIX NO. 157d2



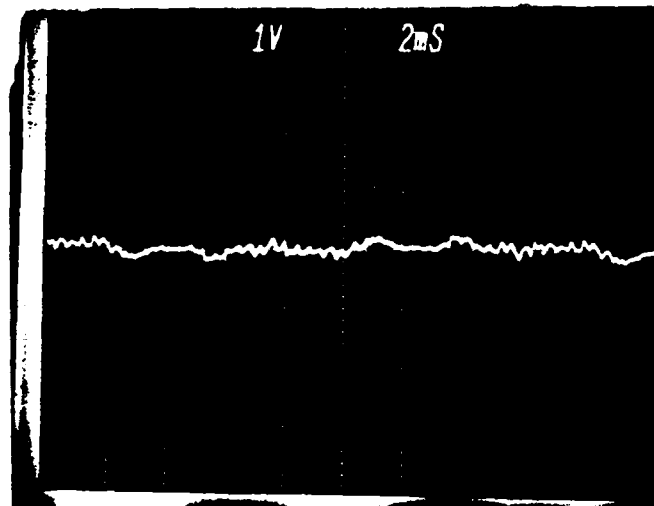
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 1J 60Hz FL
DEVIATION

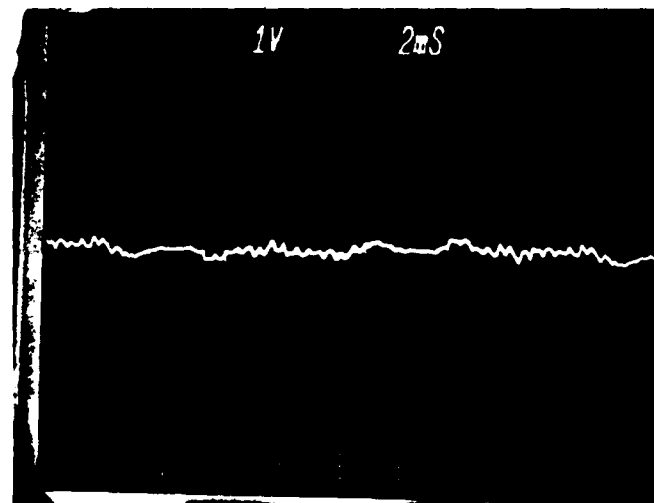
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1J
PIX NO. 1J7g



V1 V ϕ B
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1J
PIX NO. 1J7h1

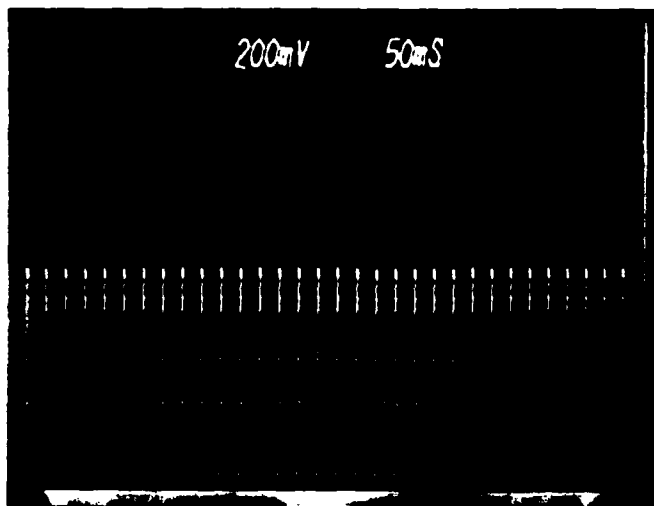


V1 V ϕ C
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 1J
PIX NO. 1J7i



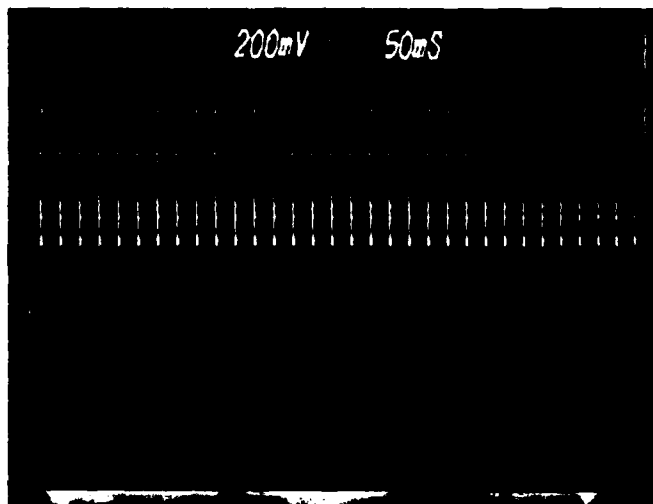
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION IJ 60Hz FL
V MOD & DEVIATION

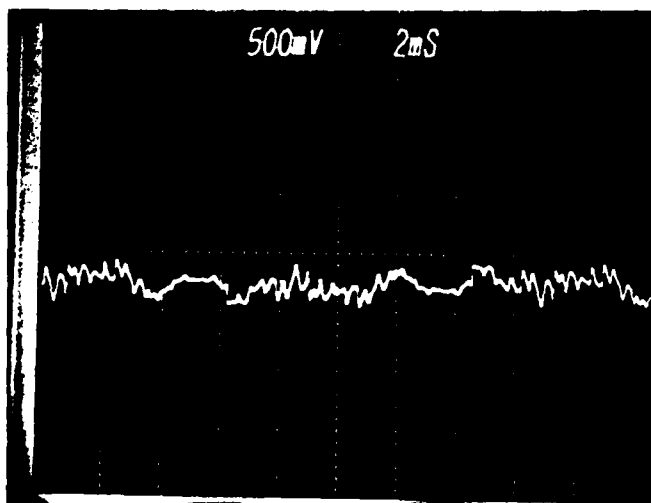
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IJ
PIX NO. IJ7j



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IJ
PIX NO. IJ7k

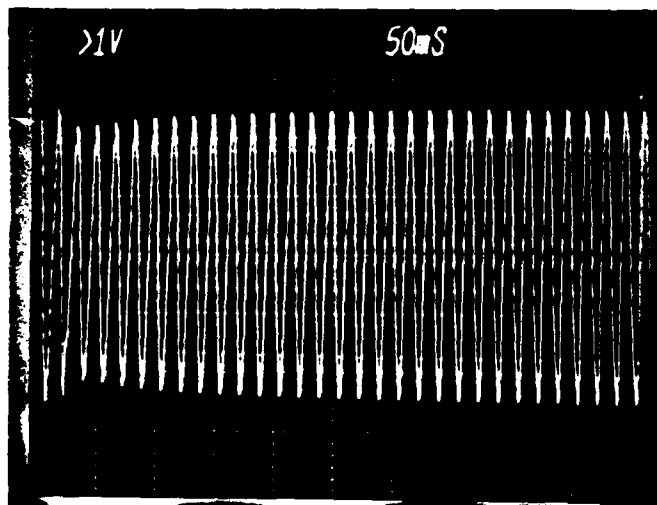


V1 V ϕ A 500/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. IJ
PIX NO. IJ7k.2



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION

NL → RL

V1 14.370 dip

V2

V3 VdA-N

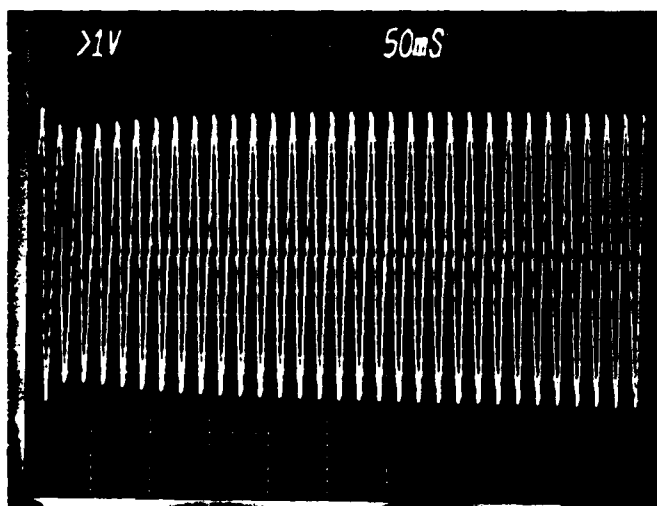
V4

H1

H2

TEST NO.

PIX NO. 1J1



V1 14.370 dip

V2

V3

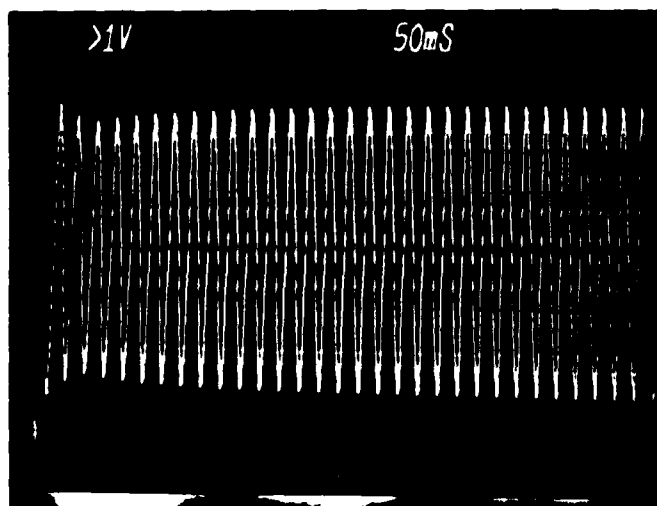
V4

H1

H2

TEST NO.

PIX NO. 1J2



V1 14.170 dip

V2

V3

V4

H1

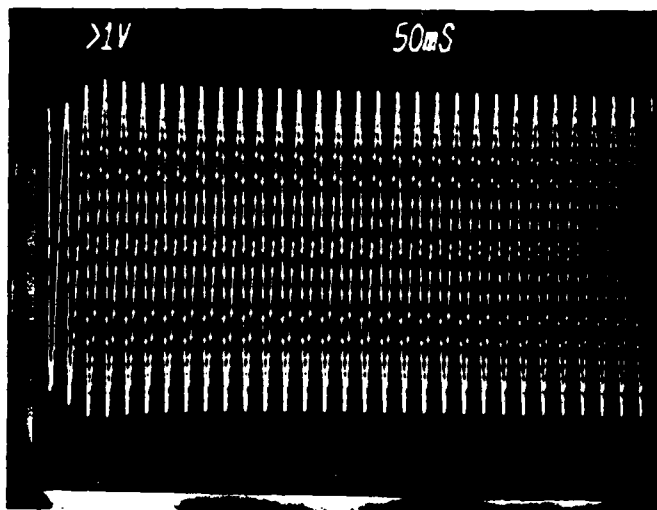
H2

TEST NO.

PIX NO. 1J3



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION

RL → NL

V1 13.19%

V2

V3

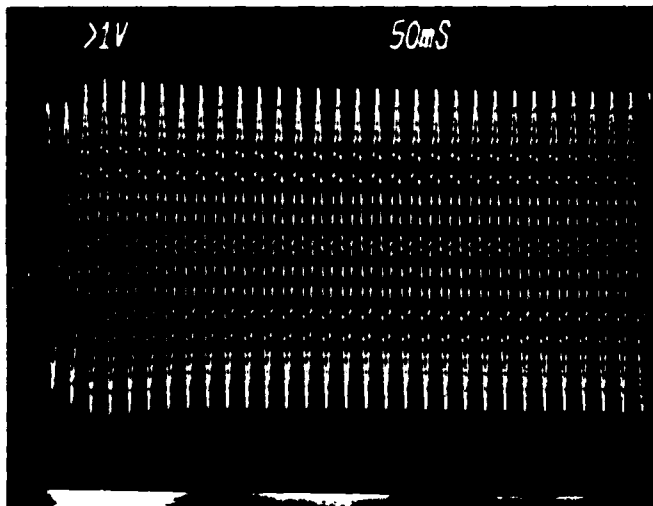
V4

H1

H2

TEST NO.

PIX NO. 1K1



V1 13.19%

V2

V3

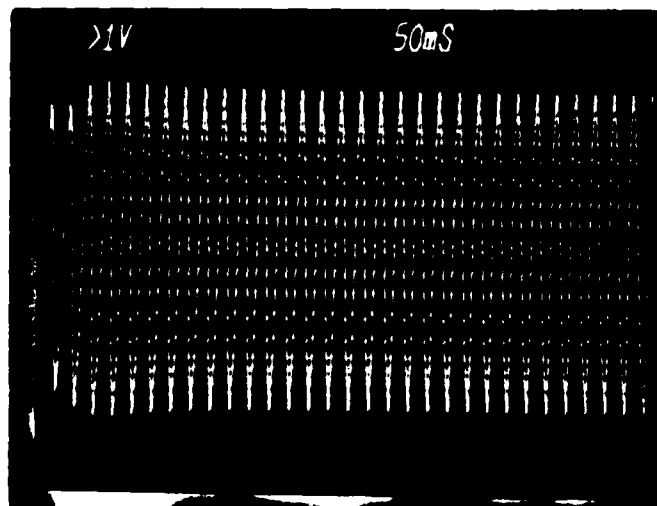
V4

H1

H2

TEST NO.

PIX NO. 1K2



V1 13.79%

V2

V3

V4

H1

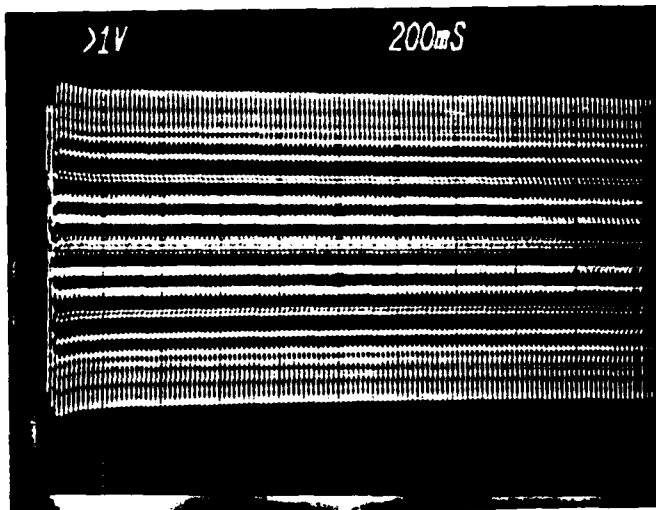
H2

TEST NO.

PIX NO. 1K3



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION

RL → NL exc 1KX1

V1 13.10%

V2 recovery NG

V3 acc 1K4R

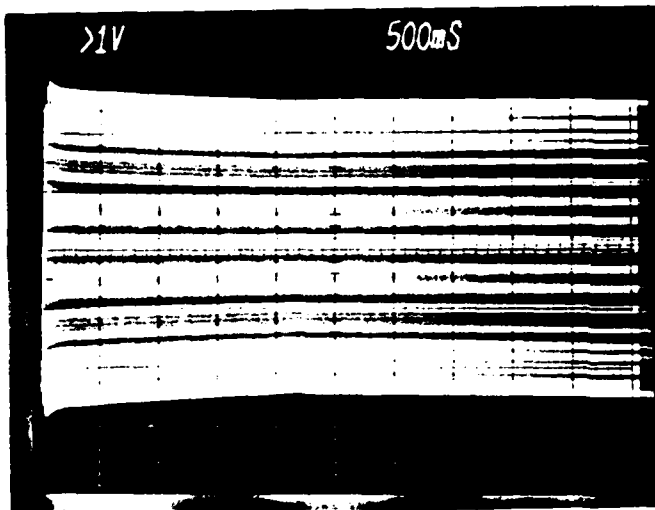
V4

H1

H2

TEST NO.

PIX NO. 1K4



V1 13.10%

V2 recovery NG

V3 acc 1K4R

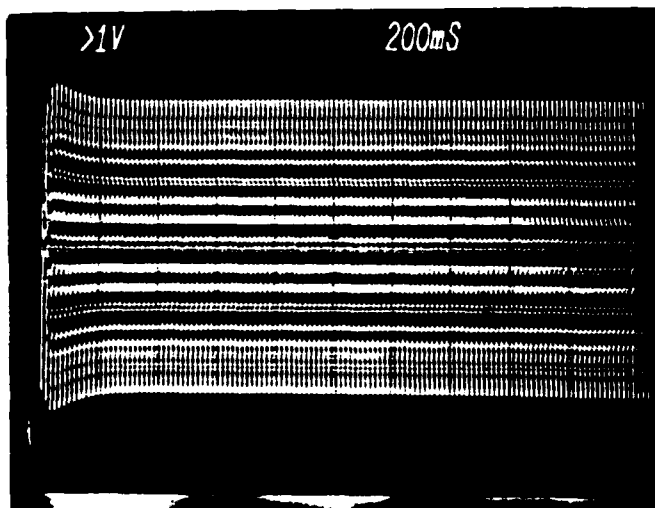
V4

H1

H2

TEST NO.

PIX NO. 1K5



RL → 2.2KW, 0.8PF

V1 10.6%

V2

V3

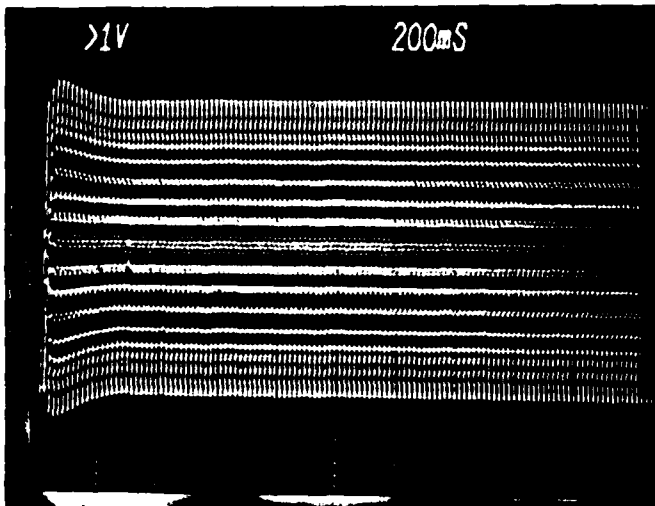
V4

H1

H2

TEST NO.

PIX NO. 1KX1



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION

RL → A/L trans

V1 13.7% rise

V2

V3

V4

H1

H2

TEST NO.

PIX NO. 1K4R

V1

V2

V3

V4

H1

H2

TEST NO.

PIX NO.

V1

V2

V3

V4

H1

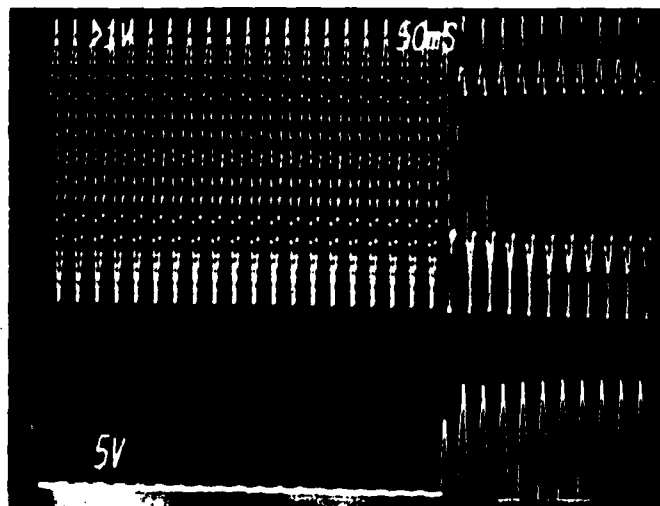
H2

TEST NO.

PIX NO.



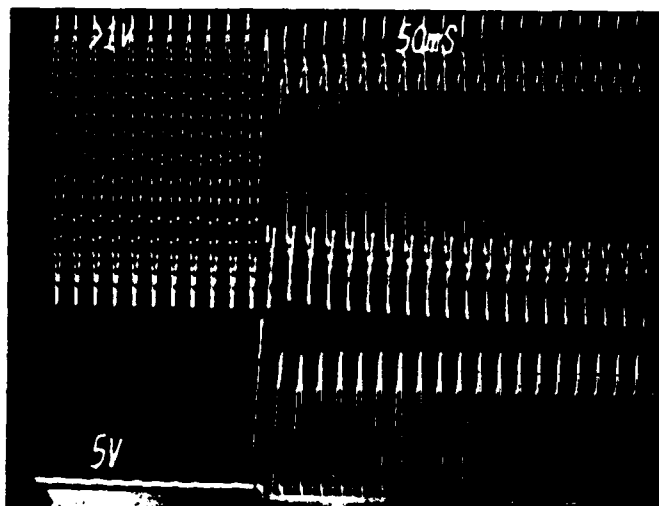
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION LPF
TRANSIENT 60Hz

V1 V ϕ A UNCAL
V2 I ϕ A SDA/DIV
V3 _____
V4 _____
H1 50ms/DIV
H2 _____

TEST NO. _____
PIX NO. 1L1



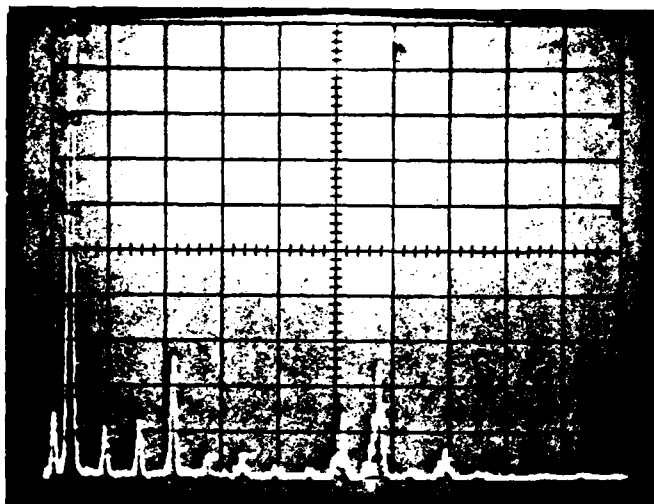
V1 V ϕ A UNCAL
V2 I ϕ A SDA/DIV
V3 _____
V4 _____
H1 50ms/DIV
H2 _____

TEST NO. _____
PIX NO. 1L2

V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____
TEST NO. _____
PIX NO. _____



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION NL 400HZ

INPUT CURRENT

V1 IQA 10A/DIV (ref RL)

V2 _____

V3 _____

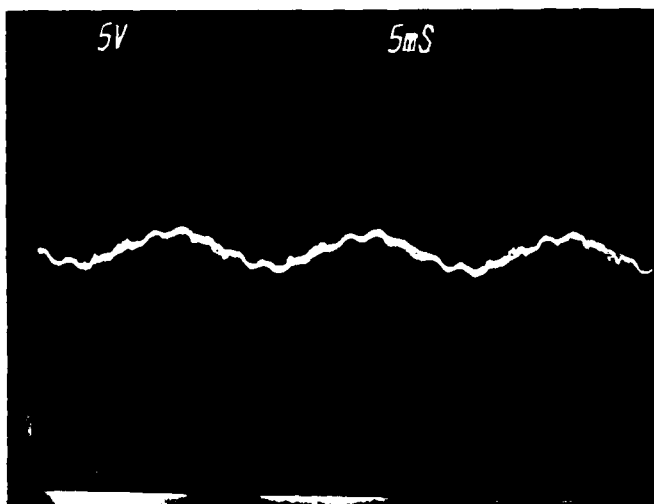
V4 200HZ / DIV

H1 _____

H2 _____

TEST NO. 4A

PIX NO. 4AA



V1 IQA current

V2 50A/DIV

V3 _____

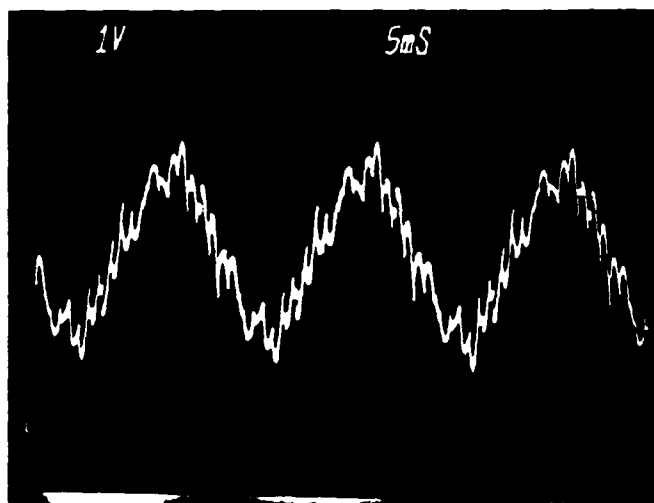
V4 _____

H1 5MS/DIV

H2 _____

TEST NO. _____

PIX NO. _____



V1 IQA current

V2 10A/DIV

V3 _____

V4 _____

H1 5MS/DIV

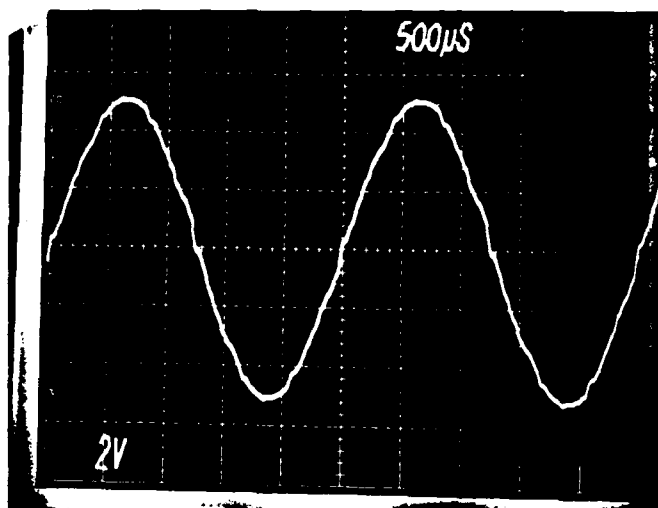
H2 _____

TEST NO. _____

PIX NO. _____



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4A 400Hz NL

V1 V ϕ A

V2

V3

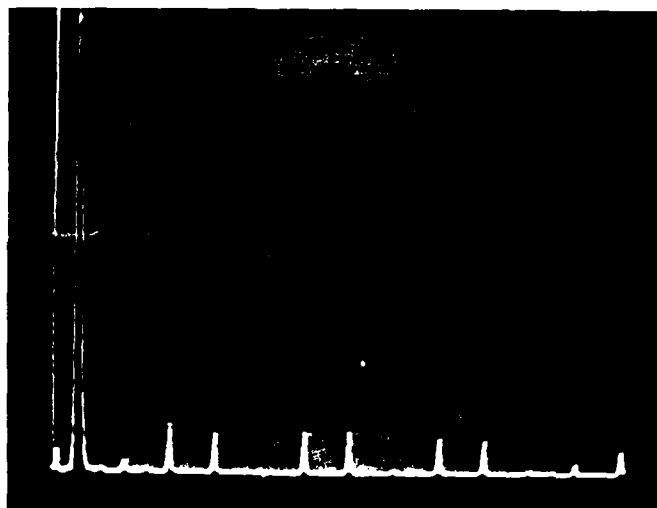
V4

H1

H2

TEST NO. 4A

PIX NO. 4A7a



V1 V ϕ A 170/DIV

V2

V3

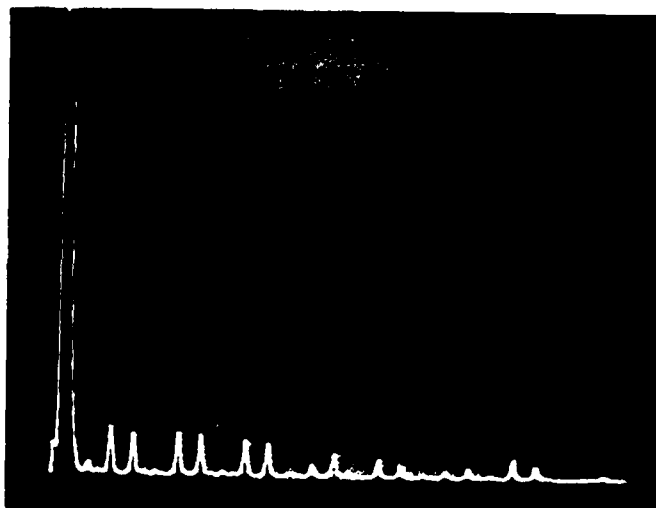
V4

H1 1KHz/DIV

H2

TEST NO. 4A

PIX NO. 4A7d1



V1 V ϕ A 170/DIV

V2

V3

V4

H1 2KHz/DIV

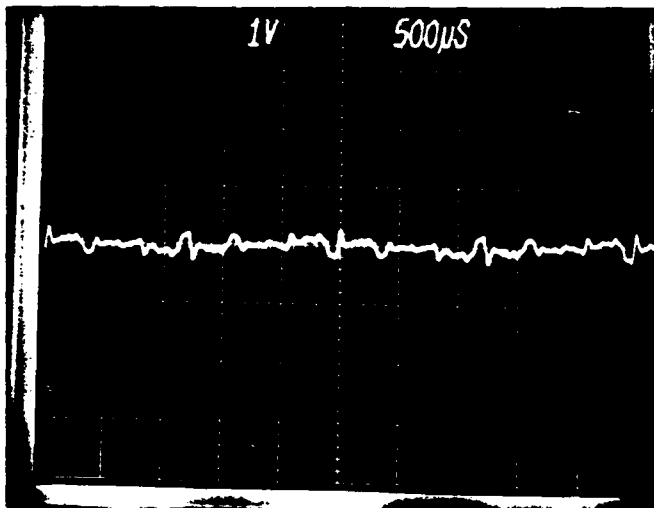
H2

TEST NO. 4A

PIX NO. 4A7d2



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4A 400Hz NL
DEVIATION

V1 V ϕ A 1070/DIV

V2

V3

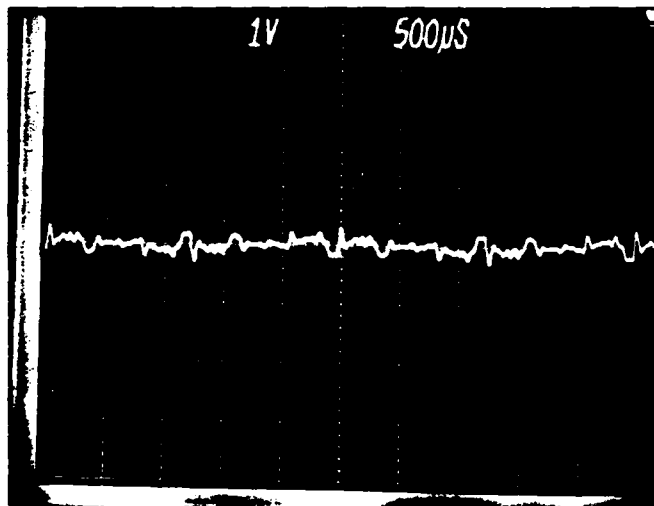
V4

H1

H2

TEST NO. 4A

PIX NO. 4A7g



V1 V ϕ B 1070/DIV

V2

V3

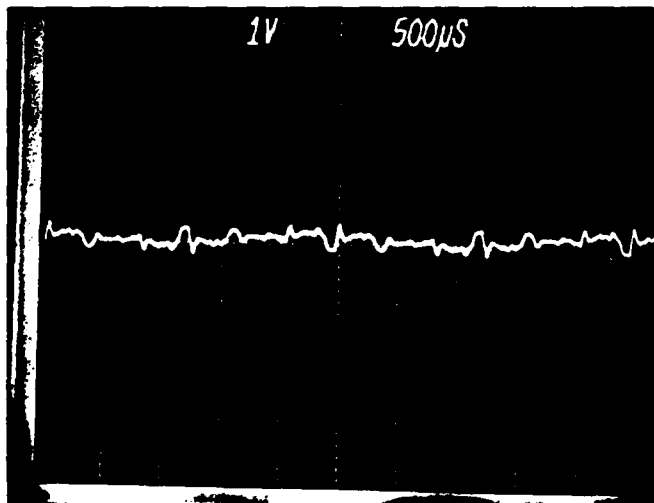
V4

H1

H2

TEST NO. 4A

PIX NO. 4A7h1



V1 V ϕ C 1070/DIV

V2

V3

V4

H1

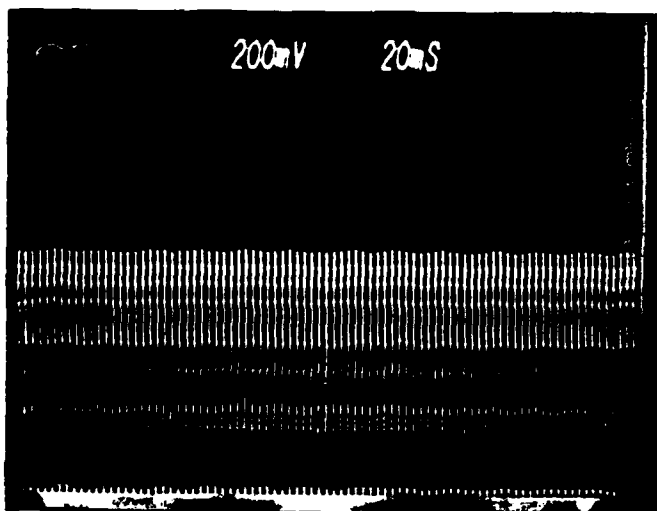
H2

TEST NO. 4A

PIX NO. 4A7i



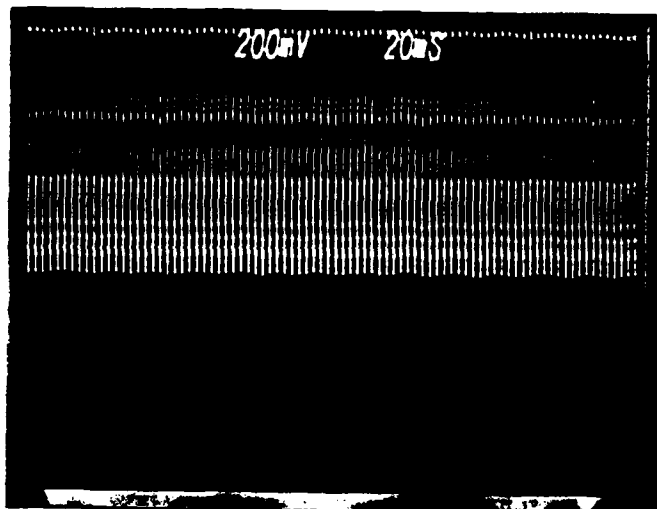
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4A 400.42 NL
V MOD & DEVIATION

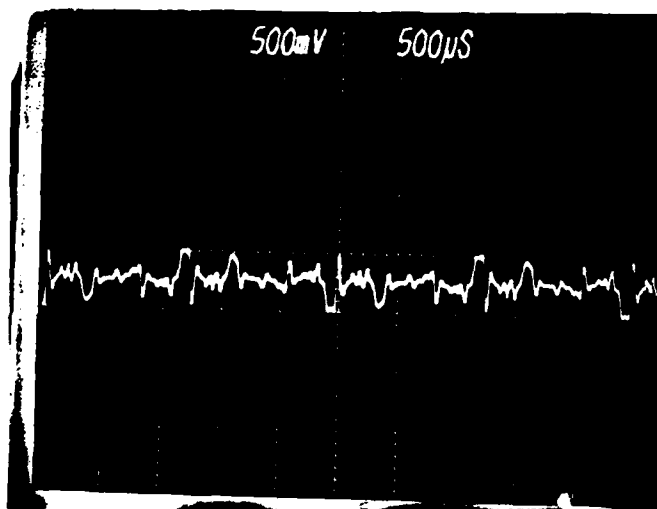
V1 V ϕ A
V2 acc 4A7j2
V3 needs filter
V4 _____
H1 _____
H2 _____

TEST NO. 4A
PIX NO. 4A7j1



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4A
PIX NO. 4A7k1

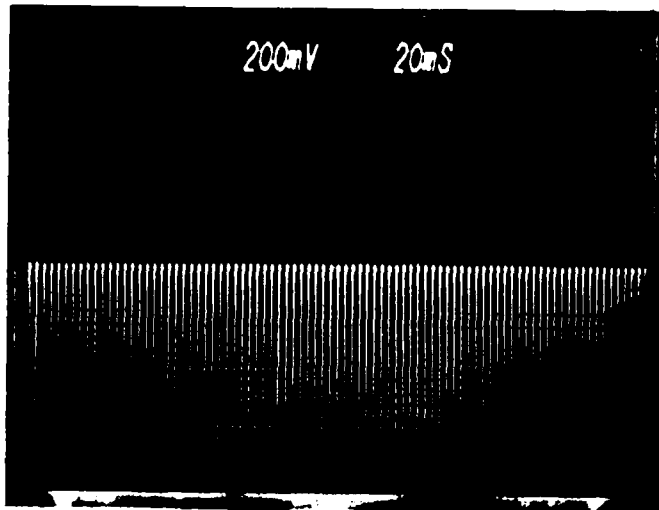


V1 V ϕ A 590/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4A
PIX NO. 4A7h2



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4A 400Hz NL

V MOD

V1 V_{0A}

V2 V_{0A} filtered

V3 LP cut off 600Hz

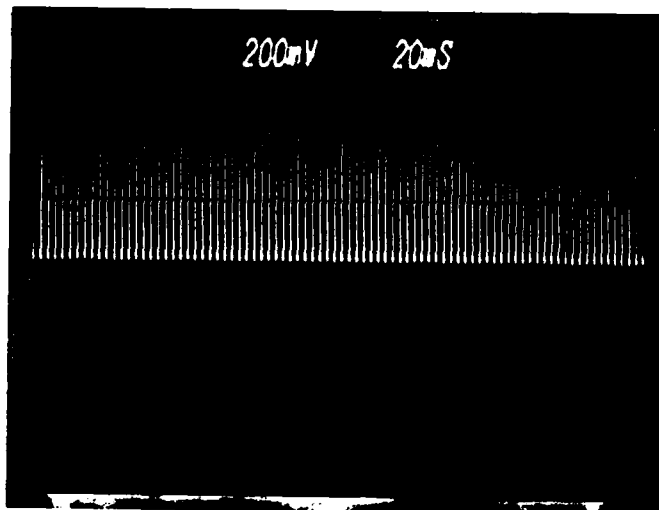
V4

H1

H2

TEST NO. 4A

PIX NO. 4A7j2



V1 V_{0A}

V2

V3

V4

H1

H2

TEST NO. 4A

PIX NO. 4A7k2

V1

V2

V3

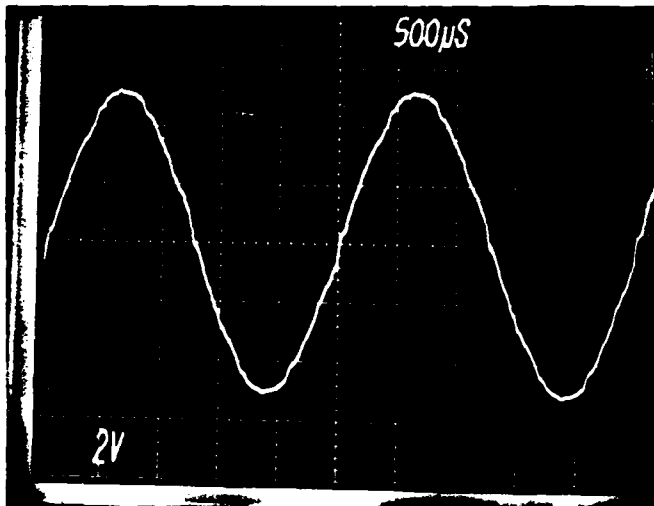
V4

H1

H2

TEST NO.

PIX NO.

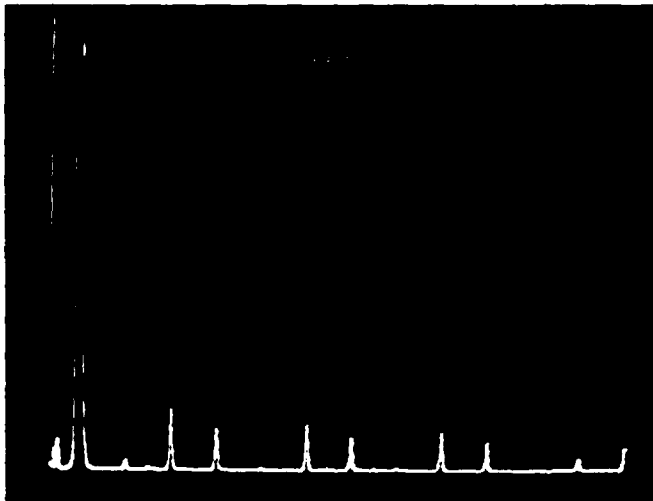


SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 4B 400Hz 1/4 RL

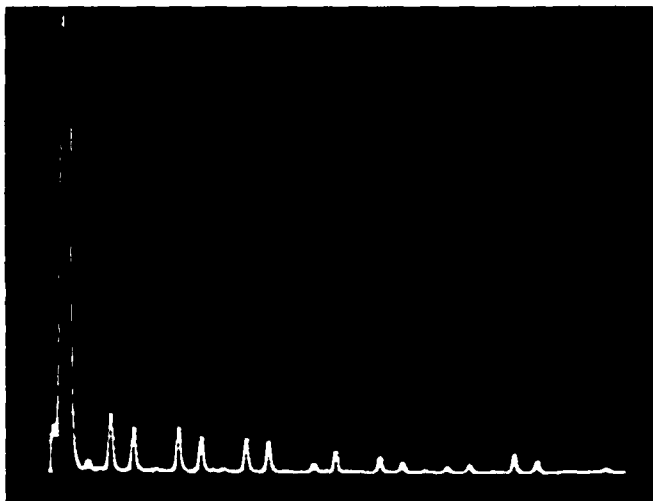
V1 VDA
 V2 _____
 V3 _____
 V4 _____
 H1 _____
 H2 _____

TEST NO. 4B
 PIX NO. 4B7a



V1 VDA 170/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 1KHz/DIV
 H2 _____

TEST NO. 4B
 PIX NO. 4B7d1

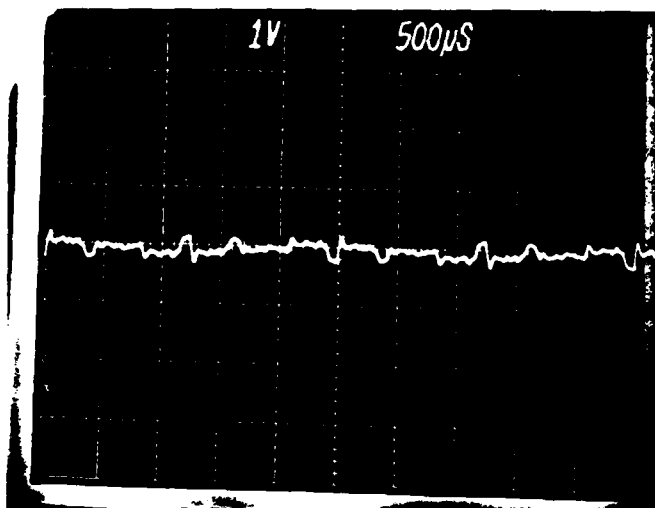


V1 VDA 170/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 2KHz/DIV
 H2 _____

TEST NO. 4B
 PIX NO. 4B7d2



SANTA BARBARA, CALIFORNIA

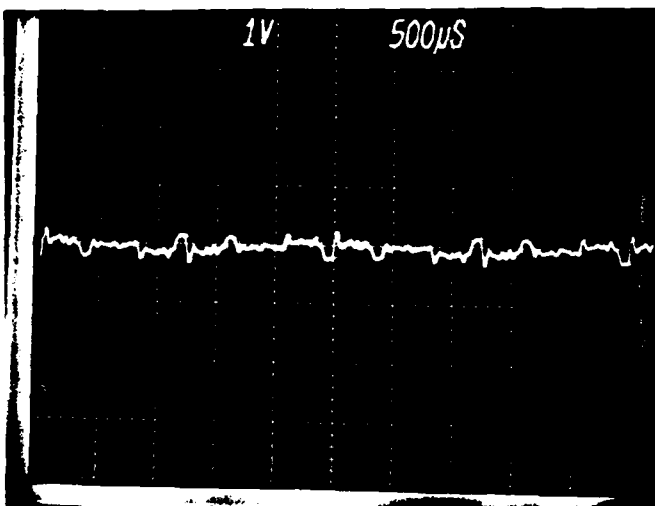


TEST DESCRIPTION 4B 400Hz 1/4RL
DEVIATION

V1 VφA 1070/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4B

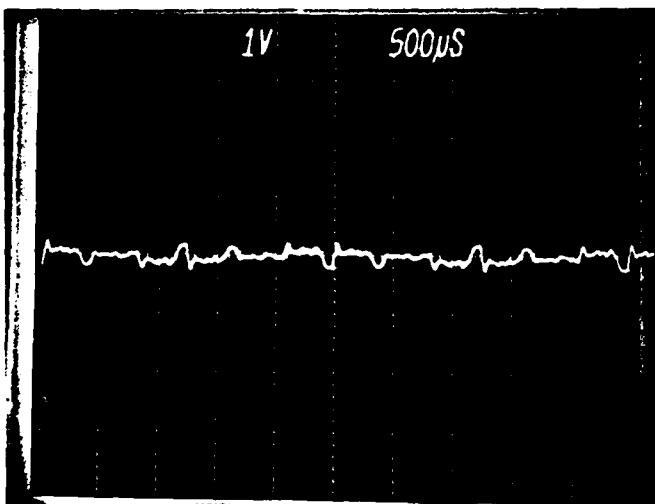
PIX NO. 4B7g



V1 VφB 1070/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4B

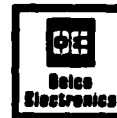
PIX NO. 4B7h1



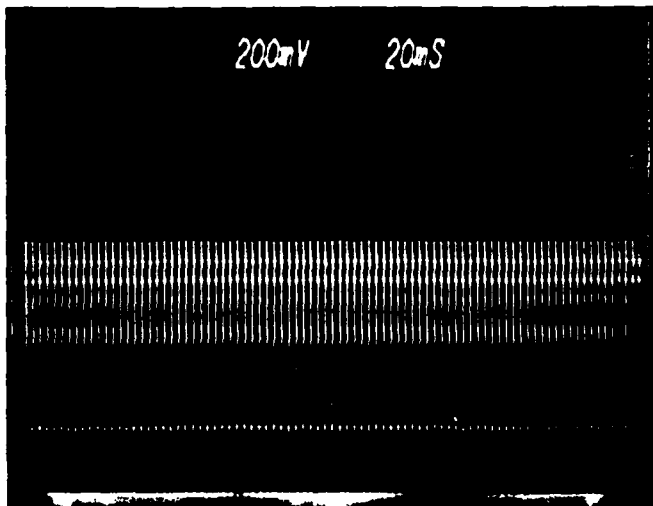
V1 VφC 1070/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4B

PIX NO. 4B7i



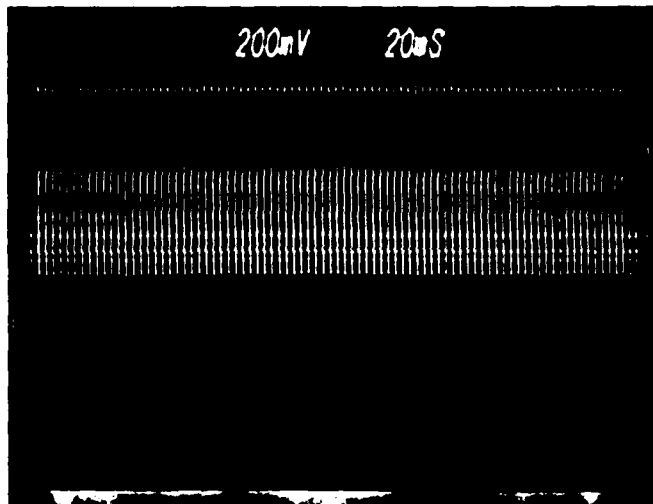
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4B 400Hz 1/4 RL
r MOD & DEVIATION

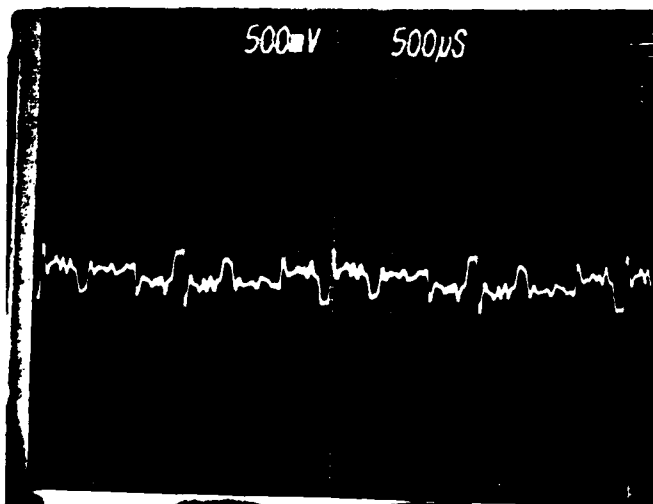
V1 V ϕ A
V2 unfiltered
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4B
PIX NO. 4B7j



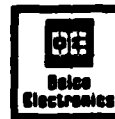
V1 V ϕ A
V2 unfiltered
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4B
PIX NO. 4B7k

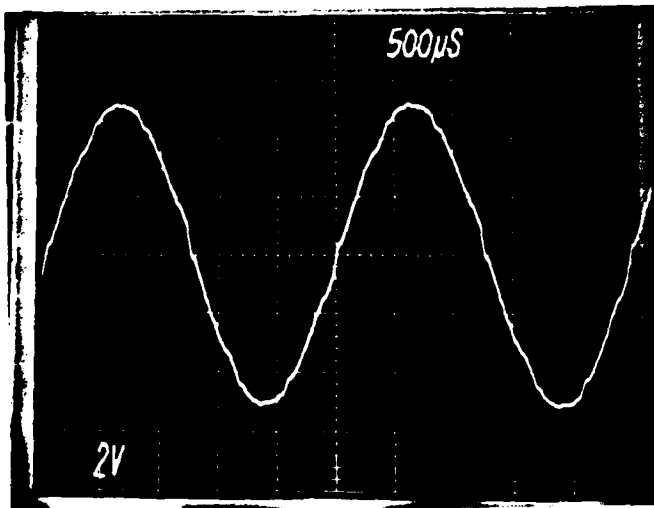


V1 V ϕ B 500/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4B
PIX NO. 4B7h2



SANTA BARBARA, CALIFORNIA

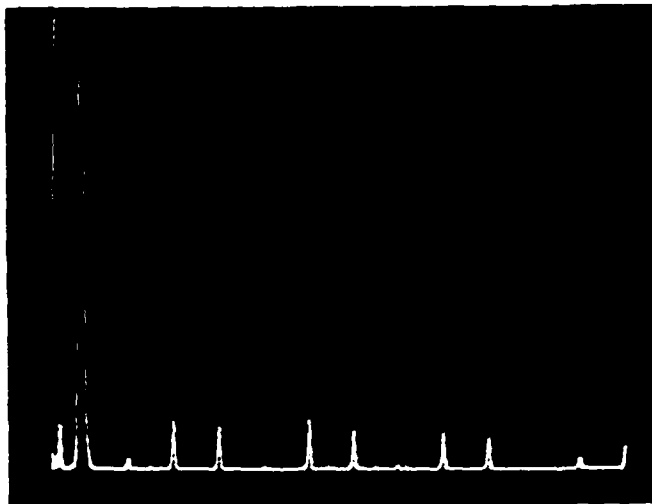


TEST DESCRIPTION 4C 400Hz 1/4FL

V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4C

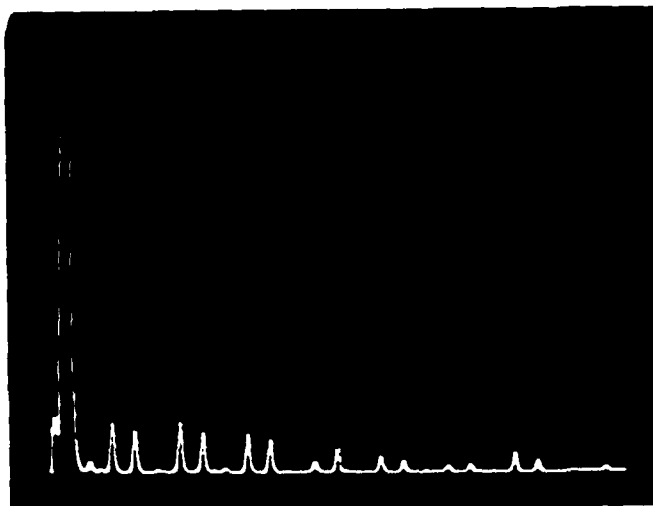
PIX NO. 4C7a



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 1KHz/DIV
H2 _____

TEST NO. 4C

PIX NO. 4C7d1



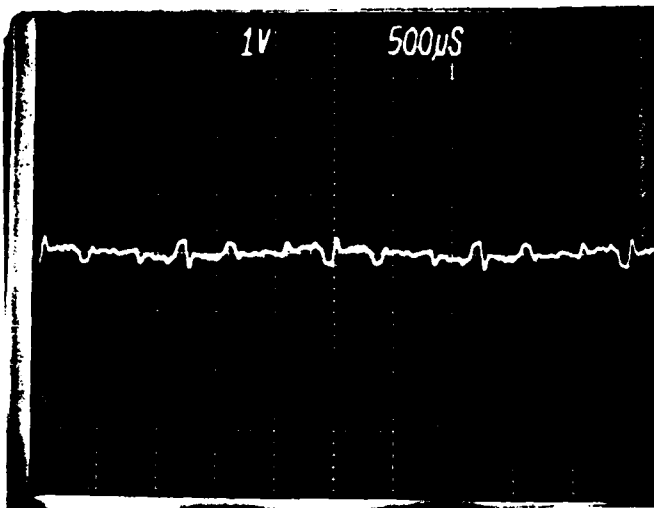
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 2KHz/DIV
H2 _____

TEST NO. 4C

PIX NO. 4C7d2



SANTA BARBARA, CALIFORNIA

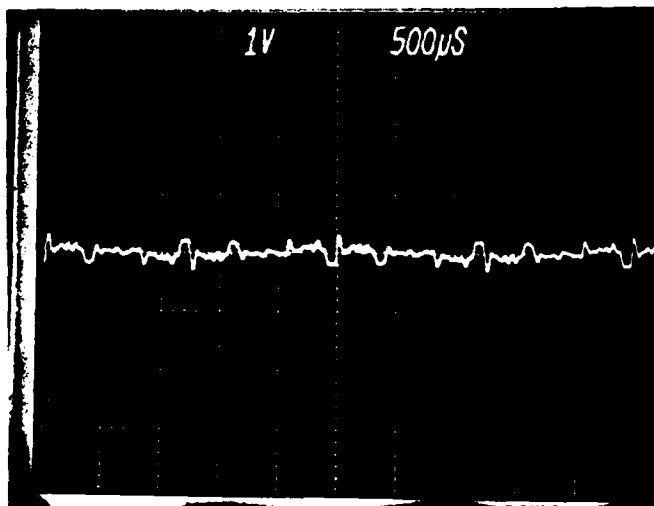


TEST DESCRIPTION 4C 400Hz 1/4PL

V1 VΦA 1090/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4C

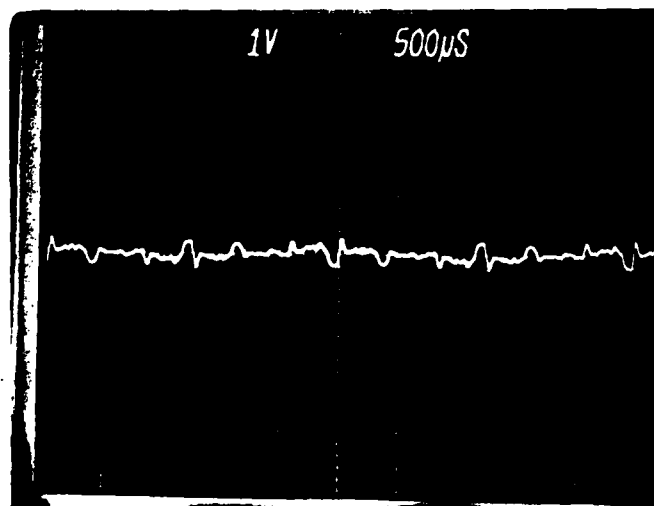
PIX NO. 4C7g



V1 VΦB 1090/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4C

PIX NO. 4C7h.1



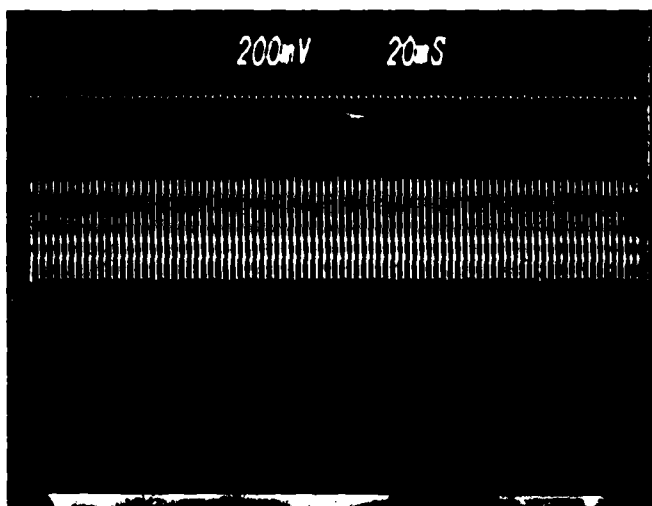
V1 VΦC 1090/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4C

PIX NO. 4C7i



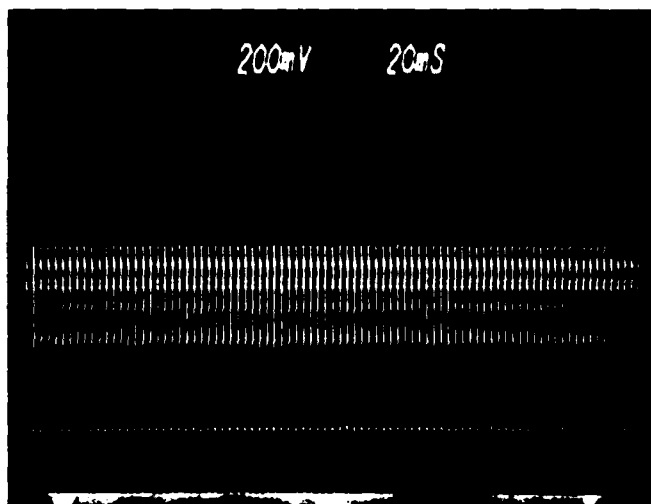
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4C 400Hz 1/4 FL
DEVIATION E VMD

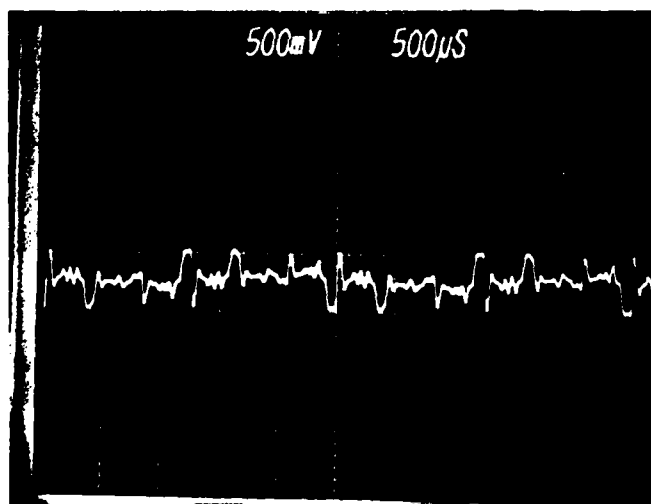
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4C
PIX NO. 4C7K



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4C
PIX NO. 4C7j

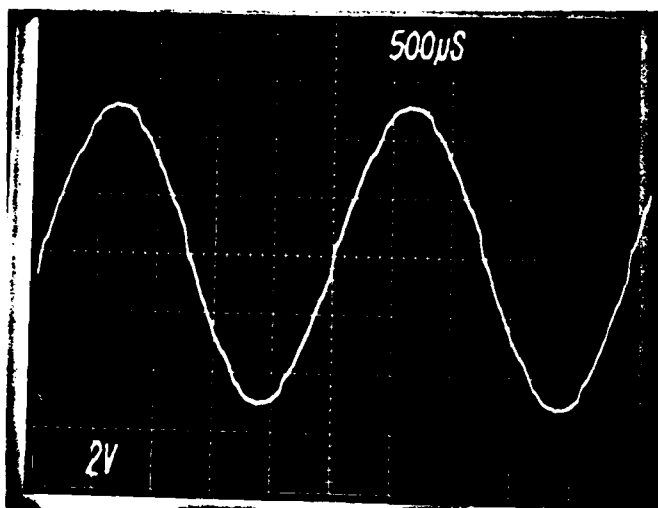


V1 V ϕ B 500/0.1V
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4C
PIX NO. 4C7h2



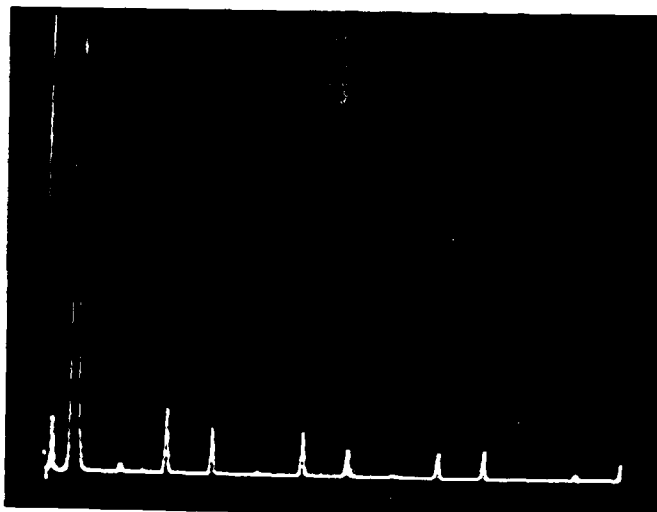
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4D 400Hz 1/2RL

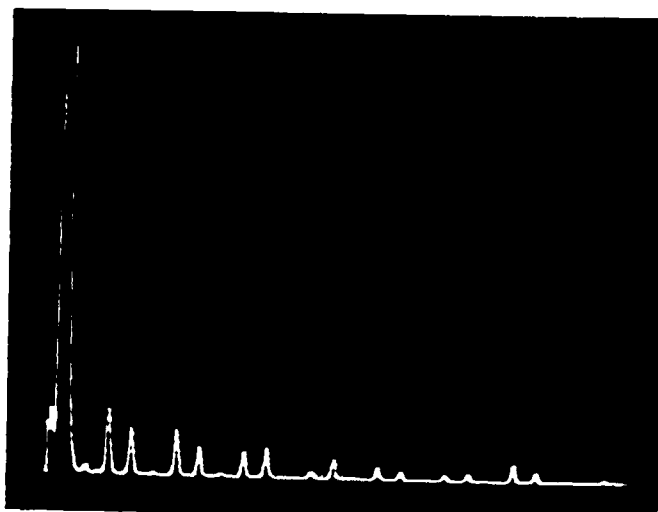
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4D
PIX NO. 4D7a



V1 V ϕ A 100/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4D
PIX NO. 4D7a1

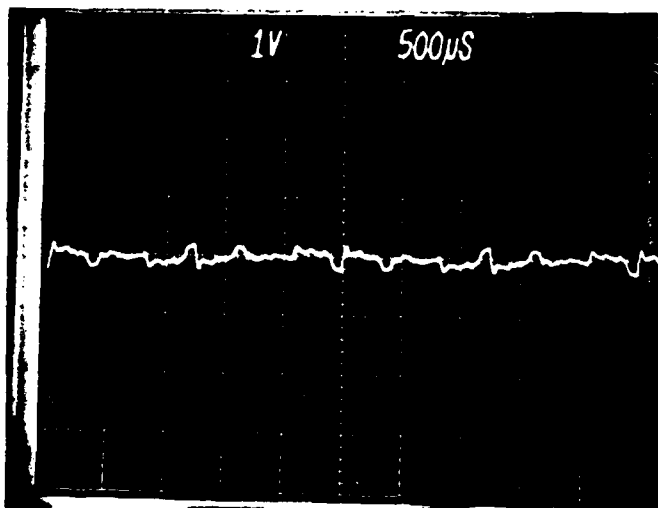


V1 V ϕ A 100/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4D
PIX NO. 4D7a2



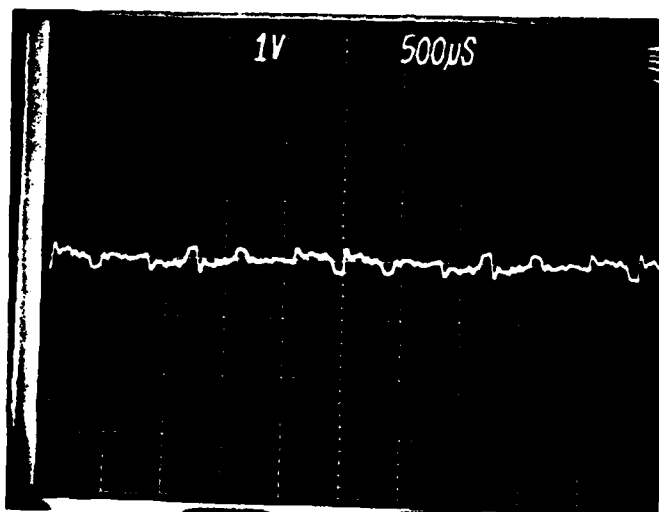
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4D 400Hz 1/2 RL
DEVIATION

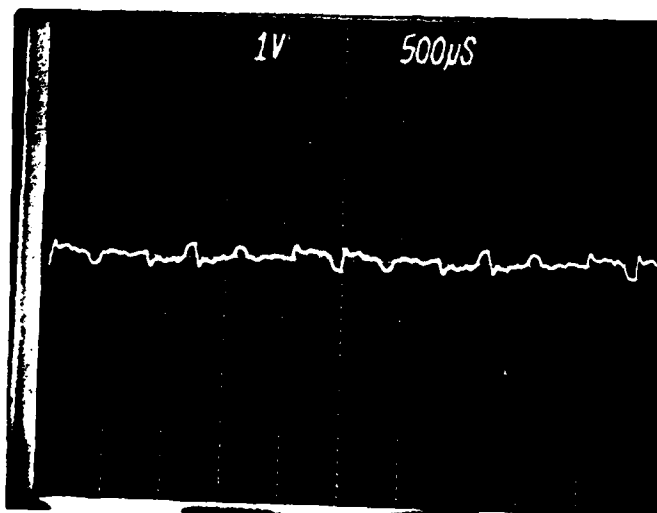
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4D
PIX NO. 4D7g



V1 V ϕ B
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4D
PIX NO. 4D7h1

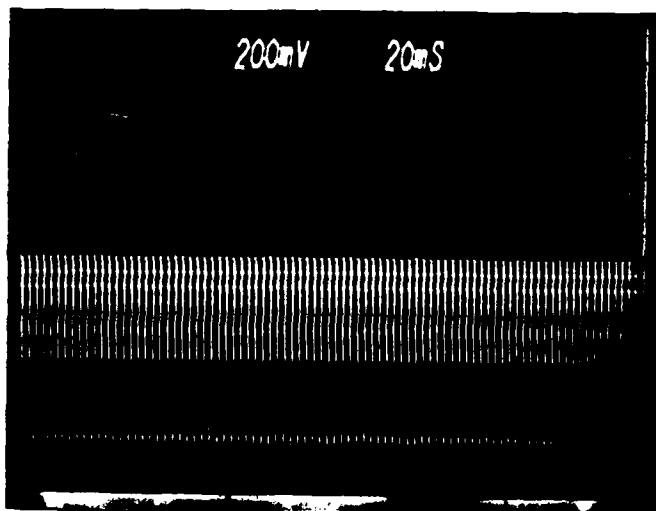


V1 V ϕ C
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4D
PIX NO. 4D7i



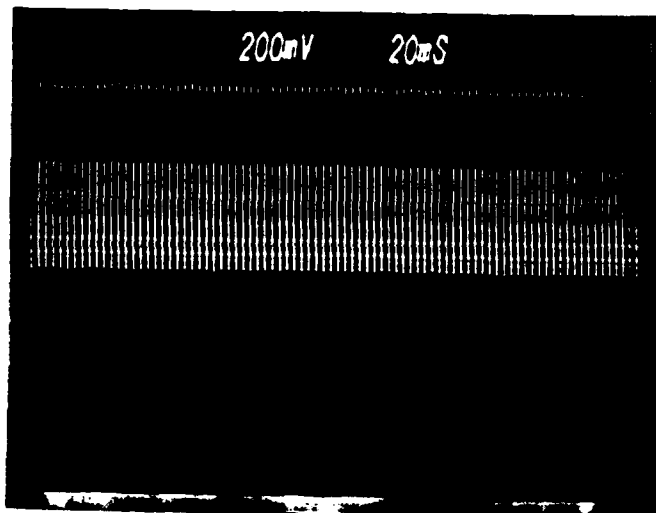
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4D 400Hz 1/2 PL
V MOD & DEVIATION

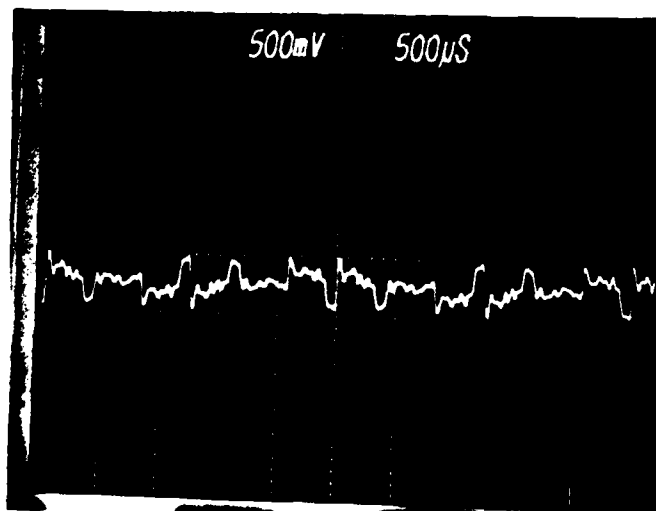
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4D
PIX NO. 4D7j



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4D
PIX NO. 4D7k

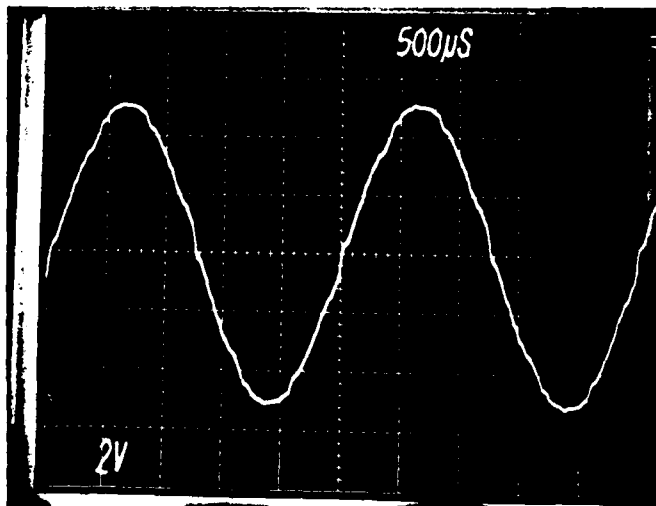


V1 V ϕ B
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4D
PIX NO. 4D7h2



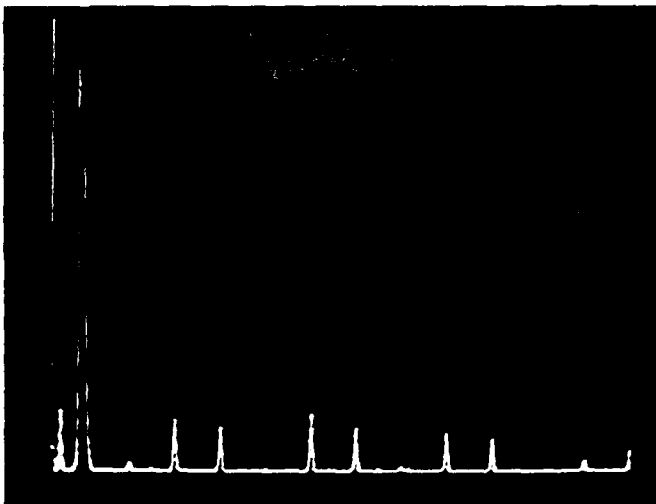
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4E 400K2 1/2FL

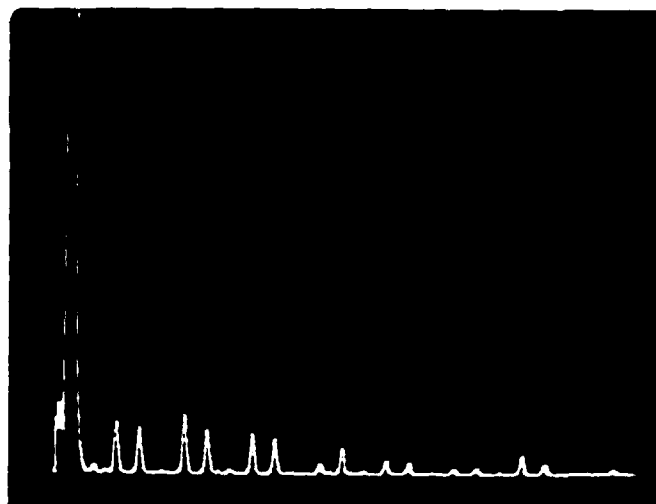
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4E
PIX NO. 4E7A



V1 V ϕ A 100/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4E
PIX NO. 4E7A1

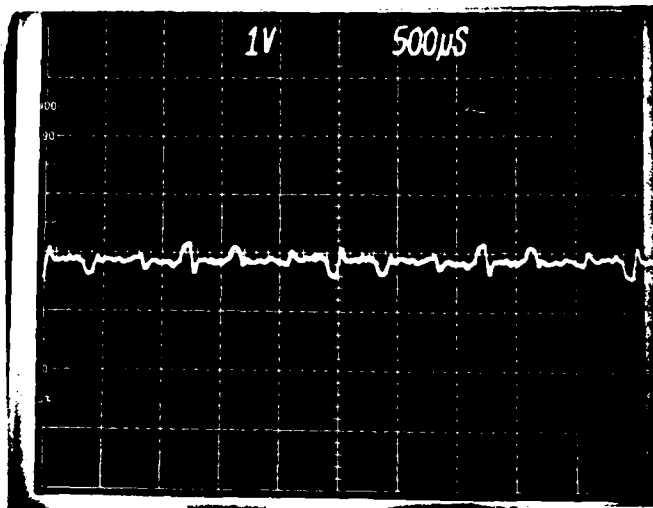


V1 V ϕ A 100/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4E
PIX NO. 4E7A2



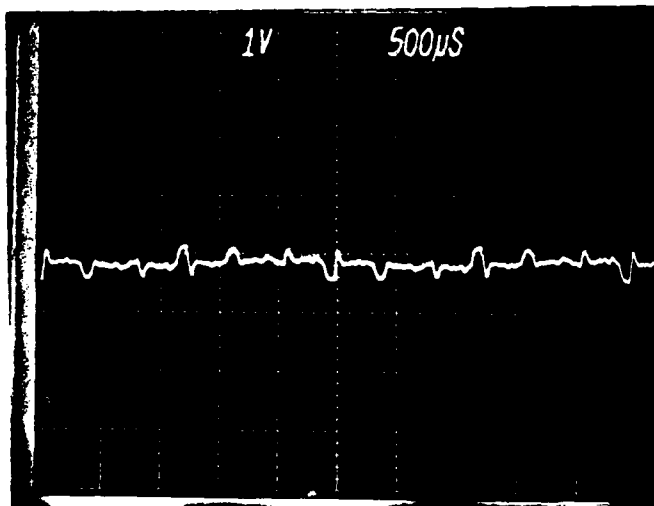
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4E 400Hz 1/2 FL
DEVIATION

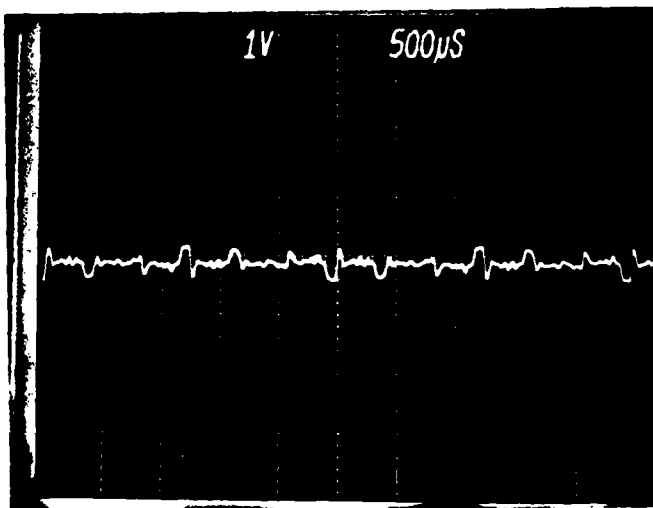
V1 VφA 1070/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4E
PIX NO. 4E7g



V1 VφB 1070/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. _____
PIX NO. 4E7h1

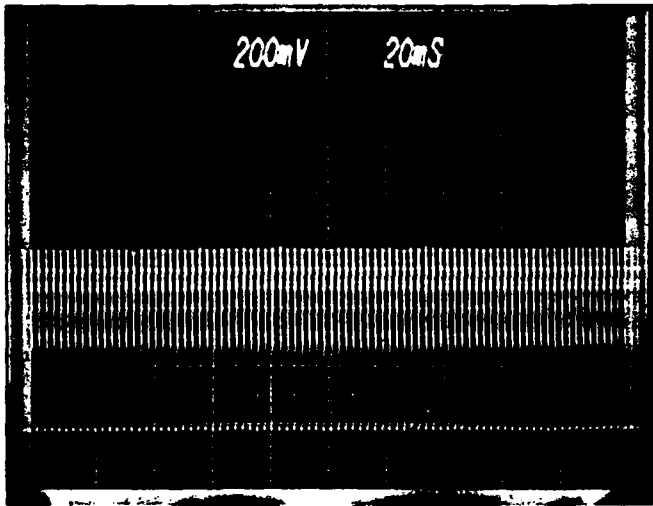


V1 VφC 1070/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4E
PIX NO. 4E7i



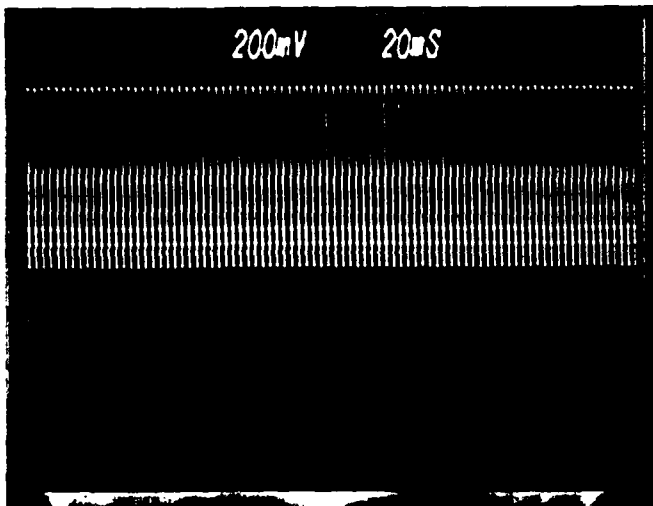
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4E 400Hz 1/2 FL
V MOD & DEVIATION

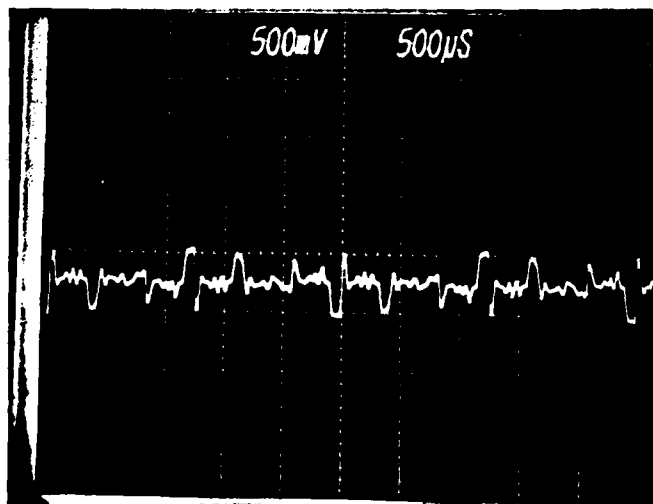
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4E
PIX NO. 4E7j



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4E
PIX NO. 4E7k

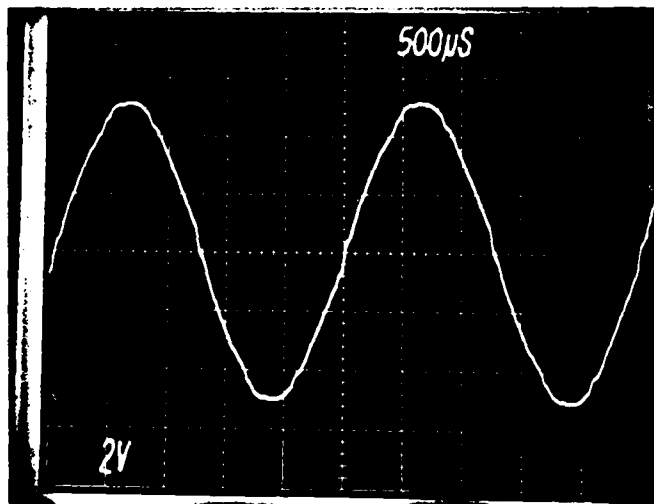


V1 V ϕ B 500/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4E
PIX NO. 4E7h2



SANTA BARBARA, CALIFORNIA

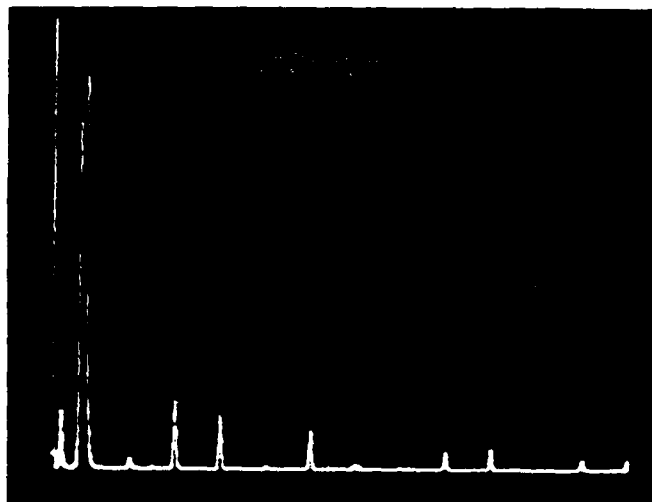


TEST DESCRIPTION 4F 400Hz 3/4RL

V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4F

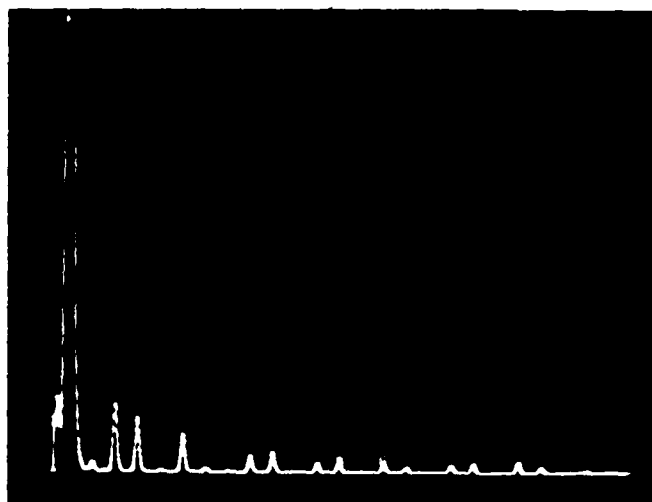
PIX NO. 4F7a



V1 V ϕ A 100/DIV
V2 _____
V3 _____
V4 _____
H1 1KHz/DIV
H2 _____

TEST NO. 4F

PIX NO. 4F7d1



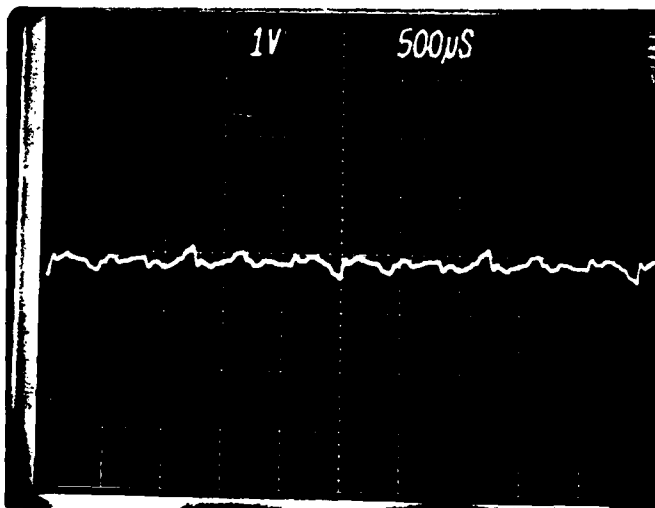
V1 V ϕ A 100/DIV
V2 _____
V3 _____
V4 _____
H1 2KHz/DIV
H2 _____

TEST NO. 4F

PIX NO. 4F7d2



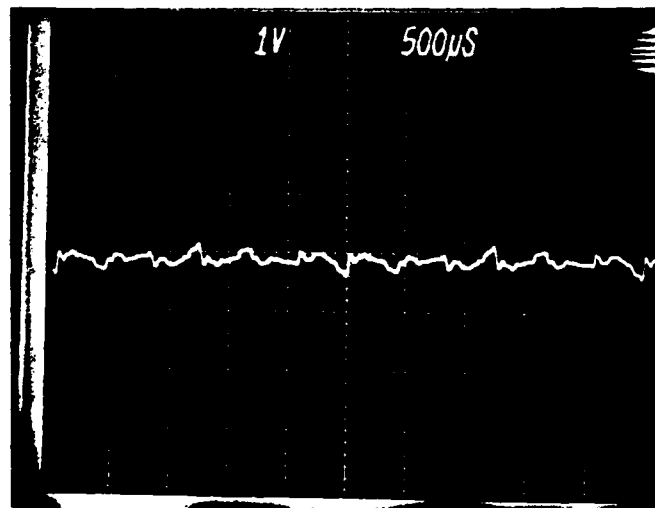
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4F 400/2 3/4 RL
DEVIATION

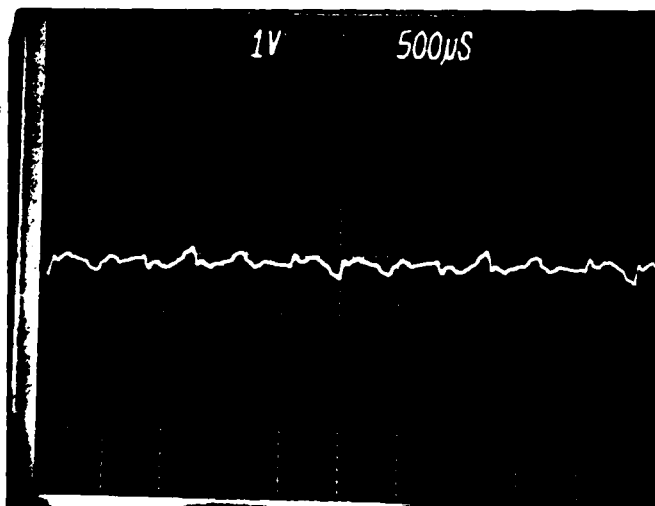
V1 V ϕ A 1090 DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4F
PIX NO. 4F7g



V1 V ϕ B 1090/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4F
PIX NO. 4F7h1

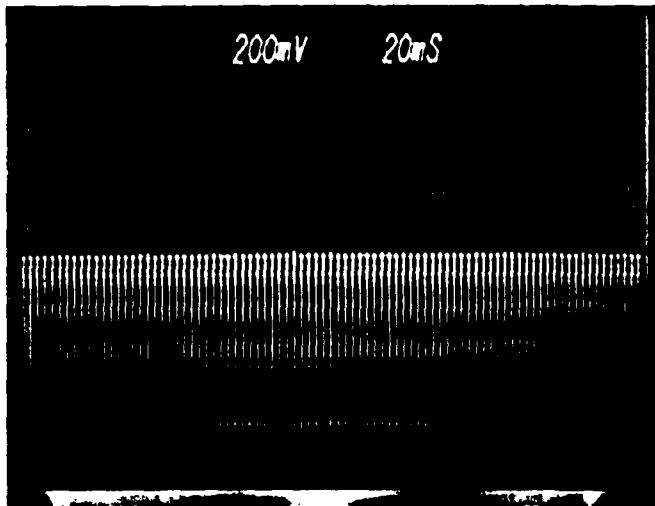


V1 V ϕ C 1090/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4F
PIX NO. 4F7i



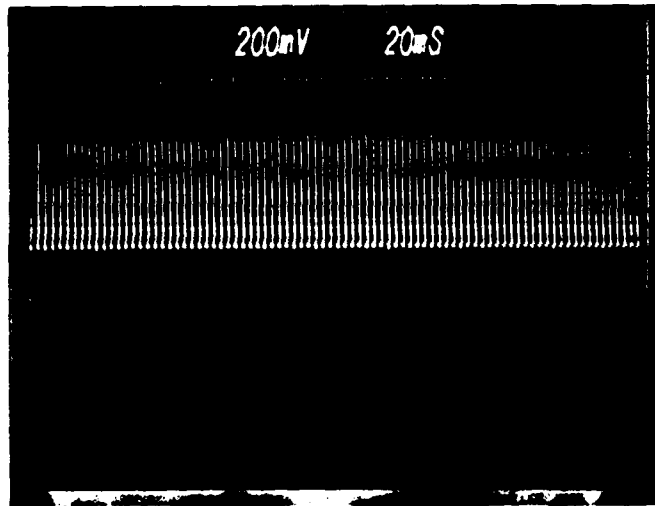
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4F 400Hz 3/4 RL
1 MOD 2, DEVIATION

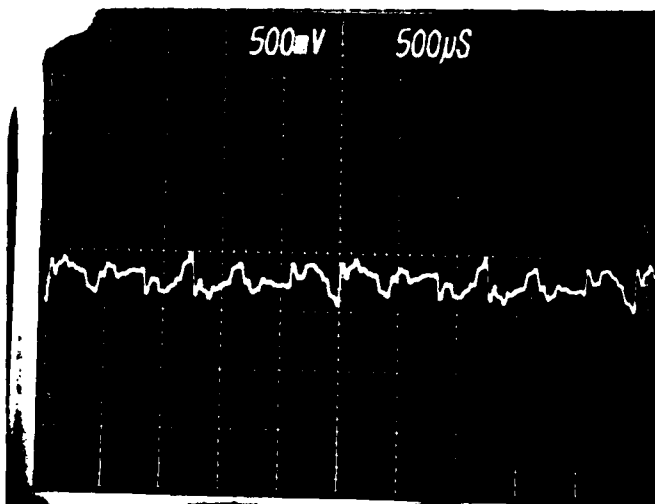
V1 VDA
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4F
PIX NO. 4F7j



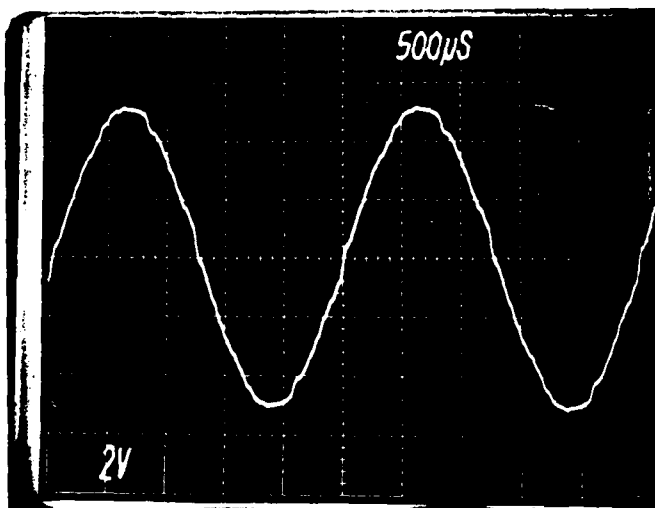
V1 VDA
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4F
PIX NO. 4F7k



V1 VDA 570/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4F
PIX NO. 4F7h2

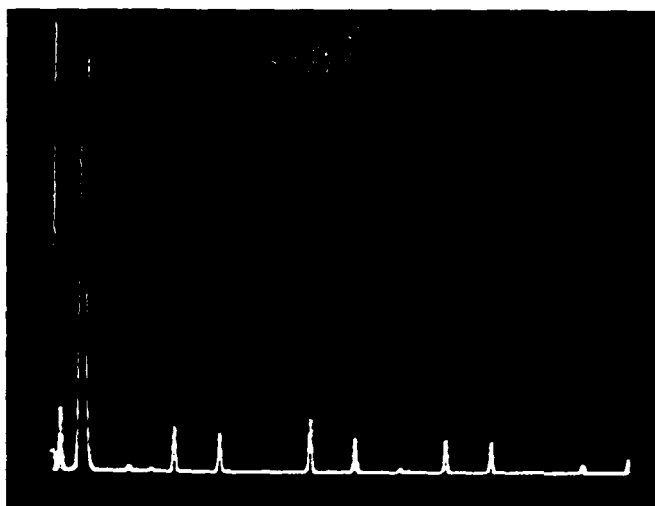


SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 4B 400Hz 3/4FL

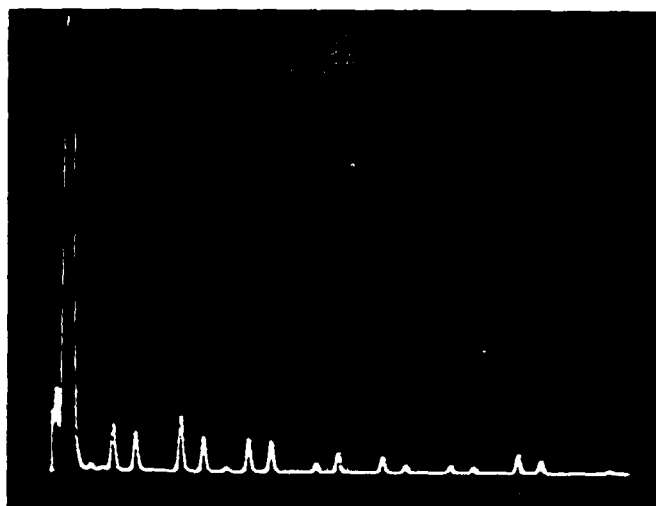
V1 V ϕ A
 V2 _____
 V3 _____
 V4 _____
 H1 _____
 H2 _____

TEST NO. 4G
 PIX NO. 4G7a



V1 V ϕ A 190/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 1KHz/DIV
 H2 _____

TEST NO. 4G
 PIX NO. 4G7d1

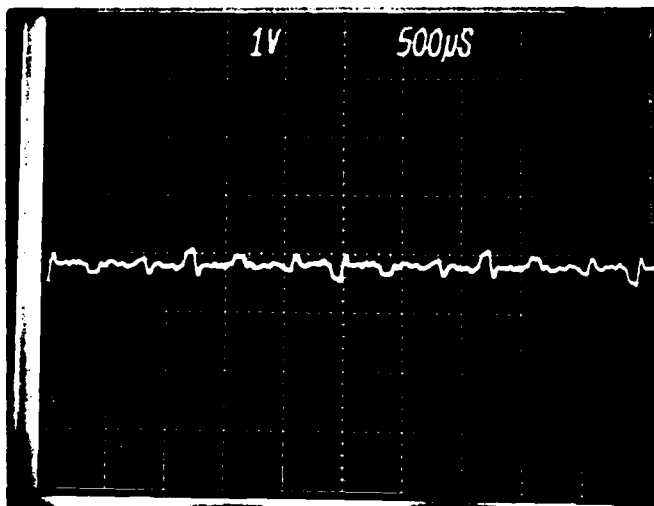


V1 V ϕ A 190/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 2KHz/DIV
 H2 _____

TEST NO. 4G
 PIX NO. 4G7d2



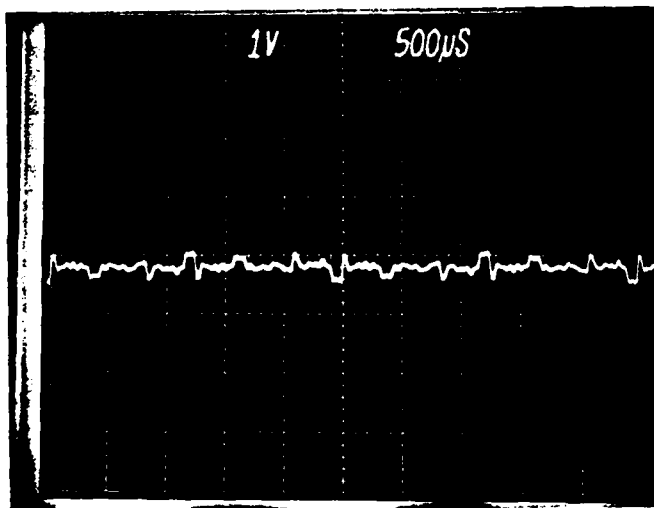
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4G 400Hz 3/4 FL
DEVIATION

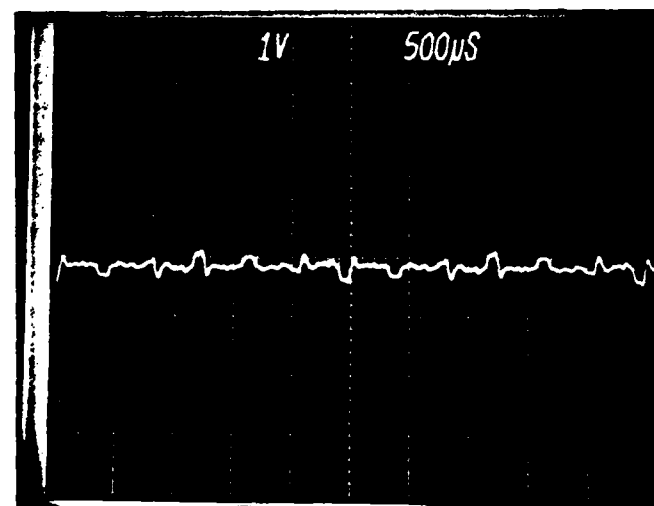
V1 V ϕ A 10% DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4G
PIX NO. 4G7g



V1 V ϕ B 10% DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4G
PIX NO. 4G7h1

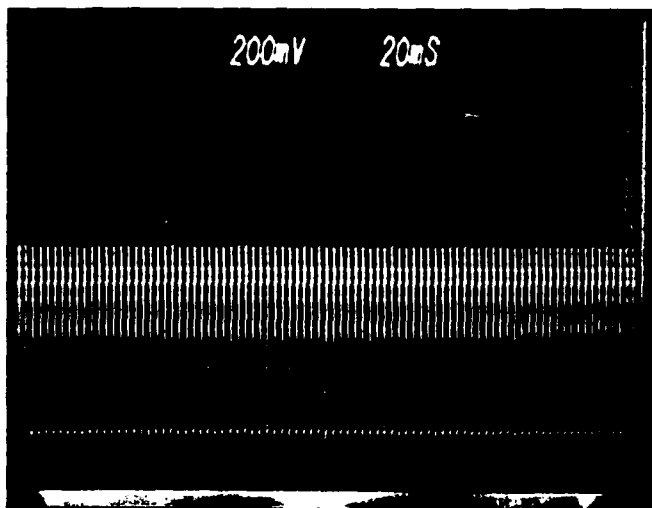


V1 V ϕ C 10% DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4G
PIX NO. 4G7i



SANTA BARBARA, CALIFORNIA

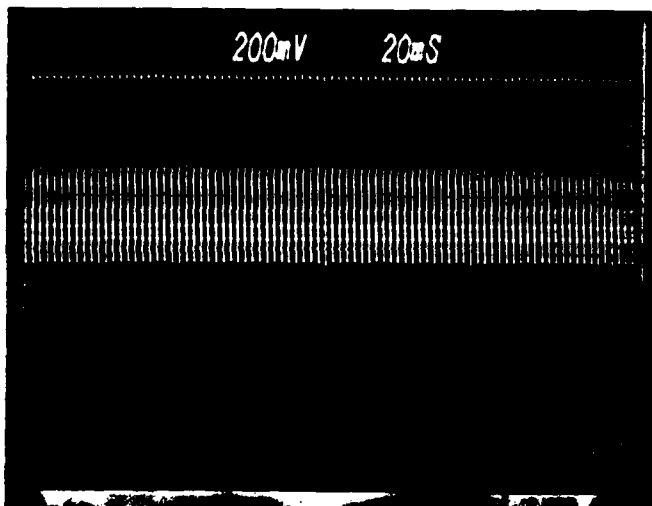


TEST DESCRIPTION 4G 400Hz 3/4 FL
VMOD & DEVIATION

V1 VDA
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4G

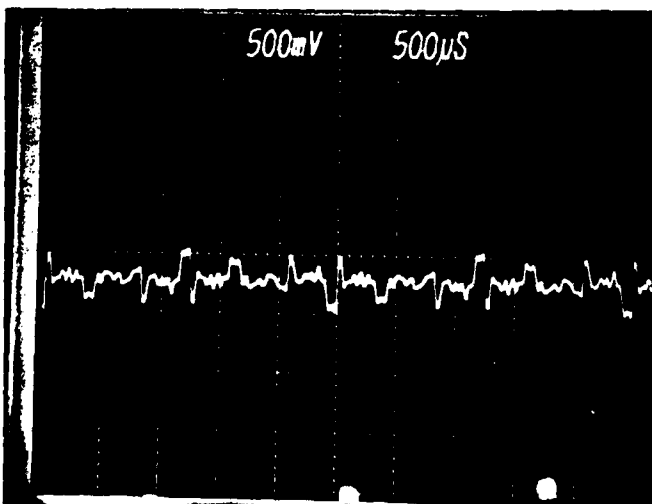
PIX NO. 4G7j



V1 VDA
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4G

PIX NO. 4G7k



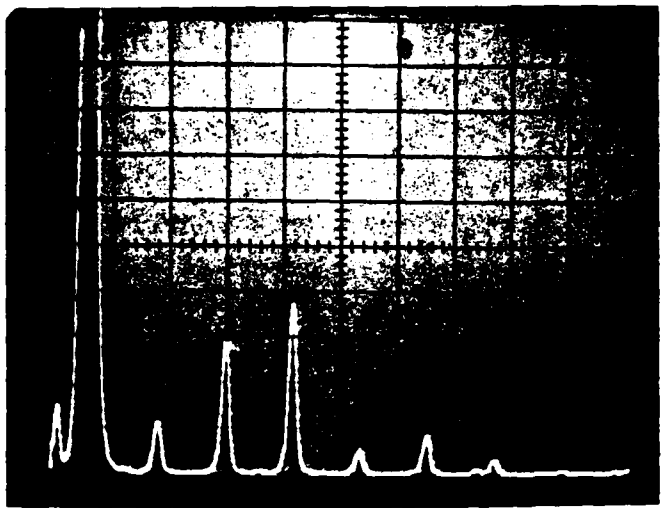
V1 VDA 500 1 DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4G

PIX NO. 4G7h2



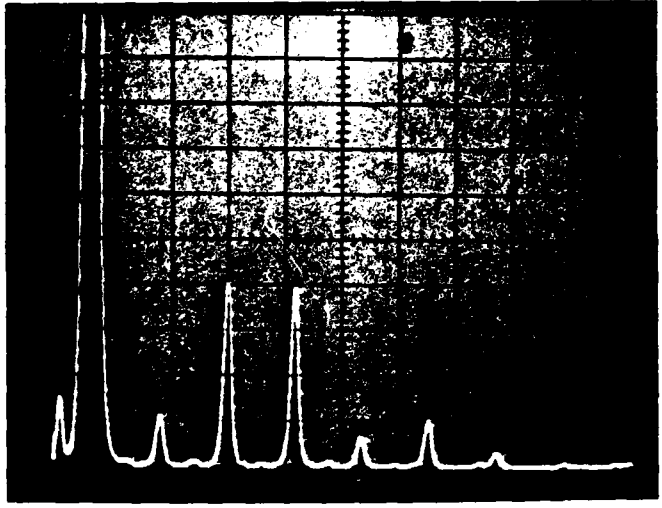
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION INPUT CURRENT
HARMONICS 400HZ RL

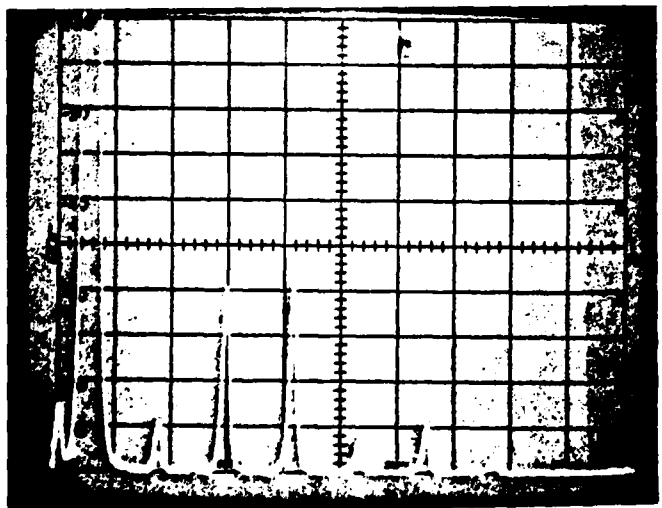
V1 _____
V2 _____
V3 _____
V4 _____
H1 100Hz/DIV
H2 _____

TEST NO. 4H
PIX NO. 4HA1



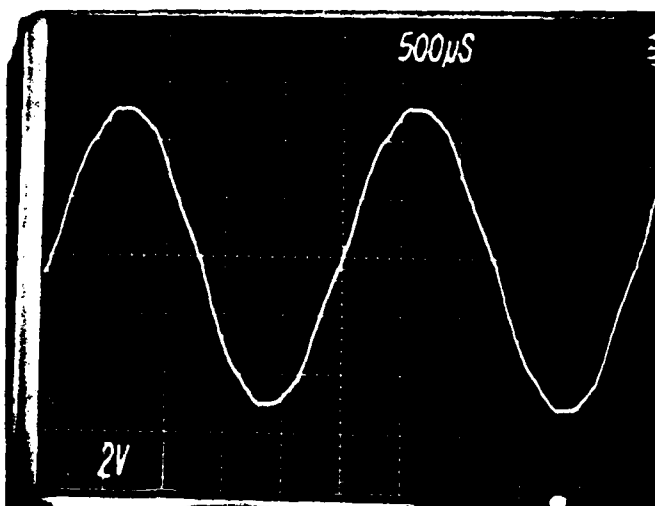
V1 _____
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4H
PIX NO. 4HB1



V1 _____
V2 _____
V3 4.290 7u
V4 _____
H1 _____
H2 _____

TEST NO. 4H
PIX NO. 4HC1

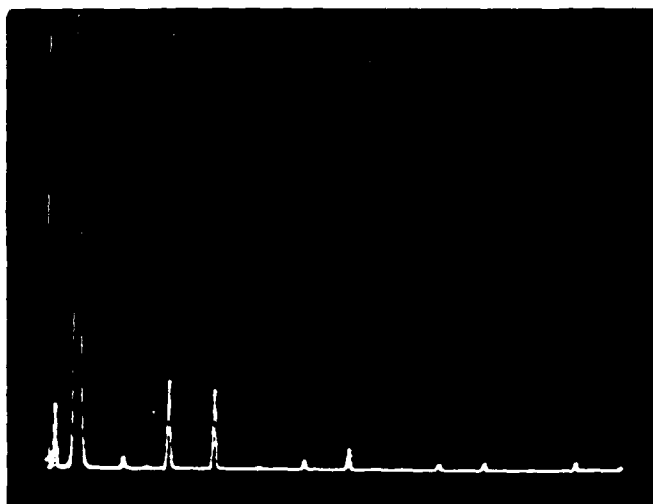


SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 4H 400KZ RL

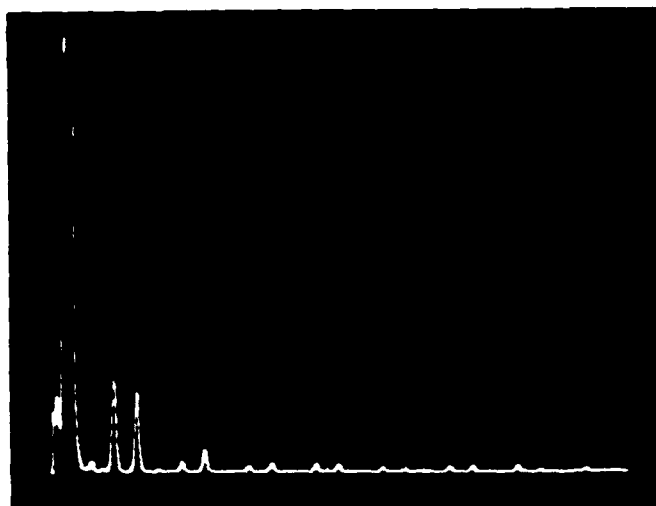
V1 VφA
 V2 _____
 V3 _____
 V4 _____
 H1 _____
 H2 _____

TEST NO. 4H
 PIX NO. 4H7a



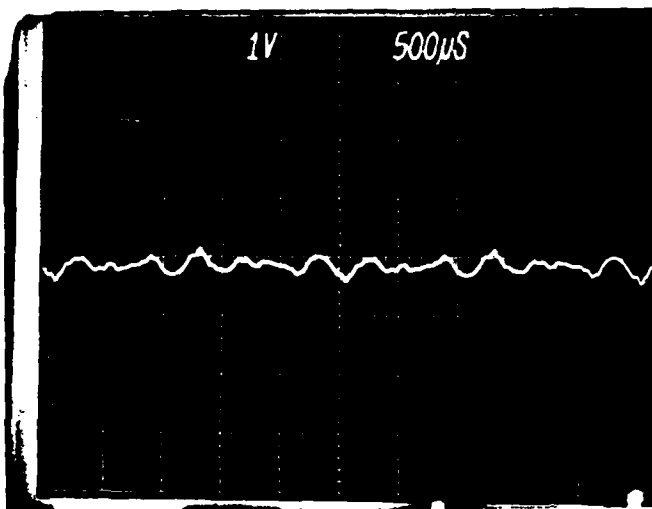
V1 VφA 100/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 1KHz/DIV
 H2 _____

TEST NO. 4H
 PIX NO. 4H7d1



V1 VφA 100/DIV
 V2 _____
 V3 _____
 V4 _____
 H1 2KHz/DIV
 H2 _____

TEST NO. 4H
 PIX NO. 4H7d2



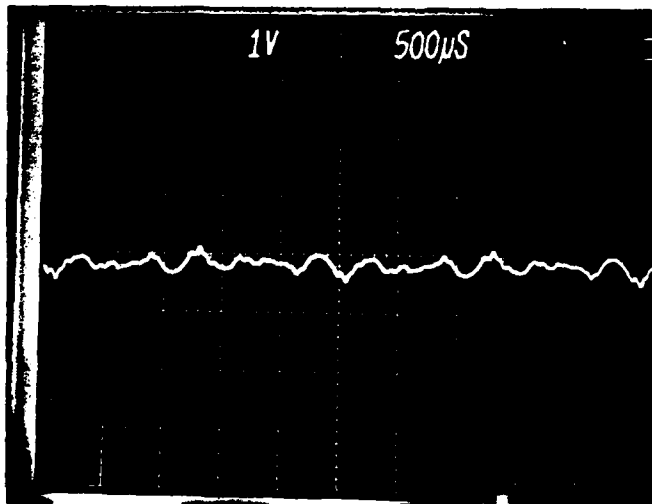
SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 4H 400HZ RL
DEVIATION

V1 V ϕ A 107 ϕ /DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4H

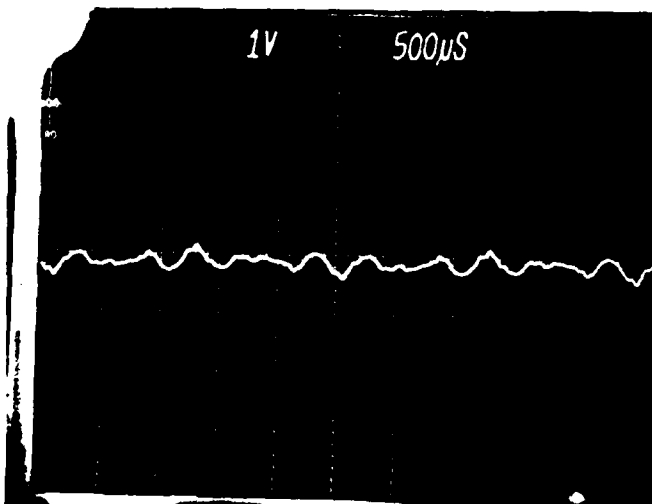
PIX NO. 4H7g1



V1 V ϕ B 109 ϕ /DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4H

PIX NO. 4H7h



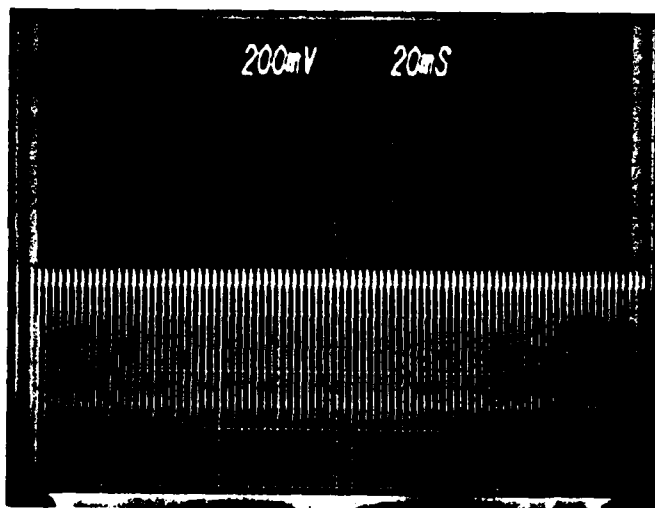
V1 V ϕ C 109 ϕ /DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4H

PIX NO. 4H7i



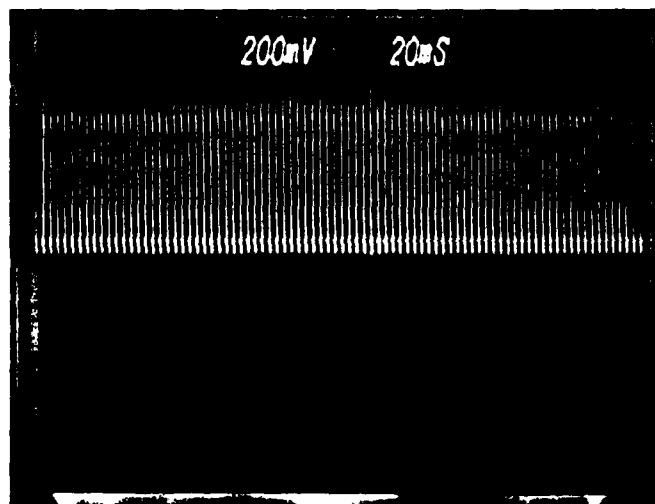
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4H 400Hz RL
V MOD & DEVIATION

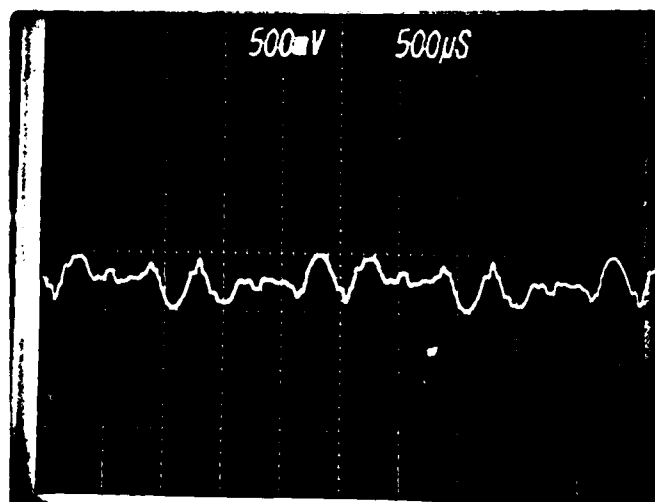
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4H
PIX NO. 4H7j



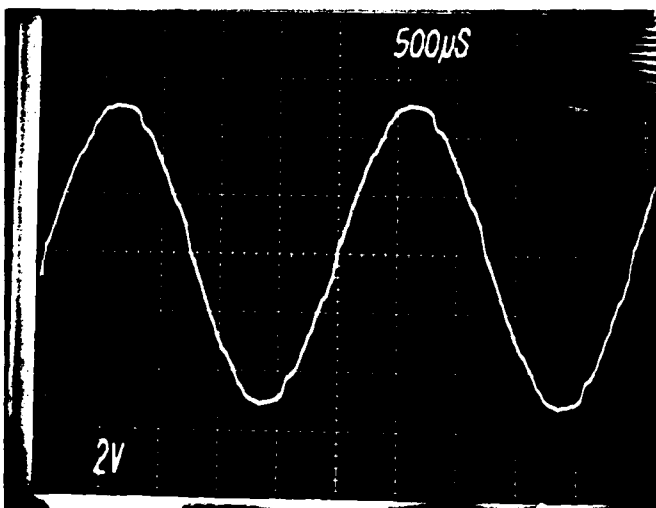
V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4H
PIX NO. 4H7k



V1 V ϕ A 570/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4H
PIX NO. 4H7g2



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 4I 400Hz FL

V1 V ϕ A

V2

V3

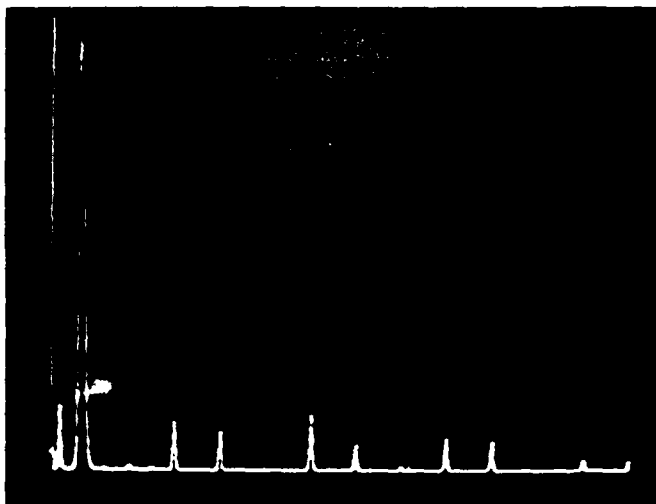
V4

H1

H2

TEST NO. 4I

PIX NO. 4I 7a



V1 V ϕ A 100/DIV

V2

V3

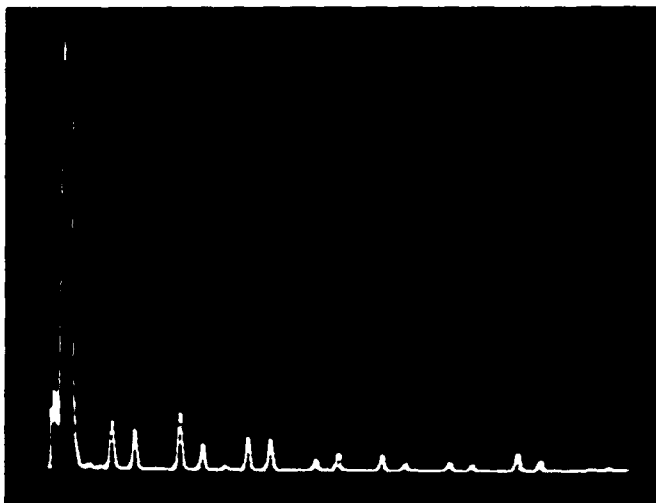
V4

H1 1KHz/DIV

H2

TEST NO. 4I

PIX NO. 4I 7d1



V1 V ϕ A 100/DIV

V2

V3

V4

H1 2KHz/DIV

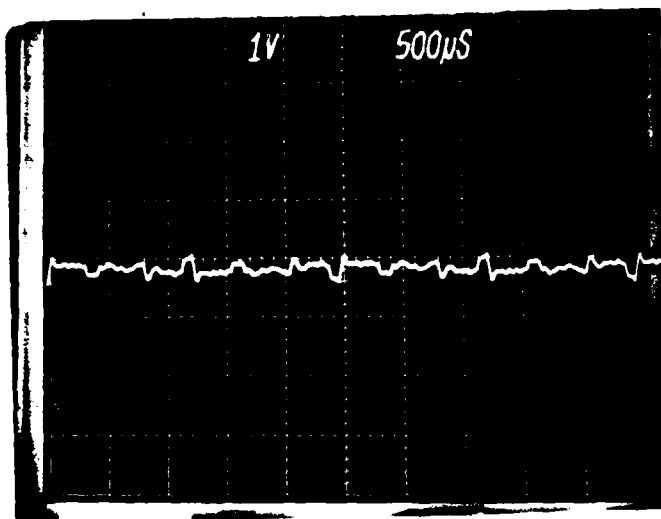
H2

TEST NO. 4I

PIX NO. 4I 7d2



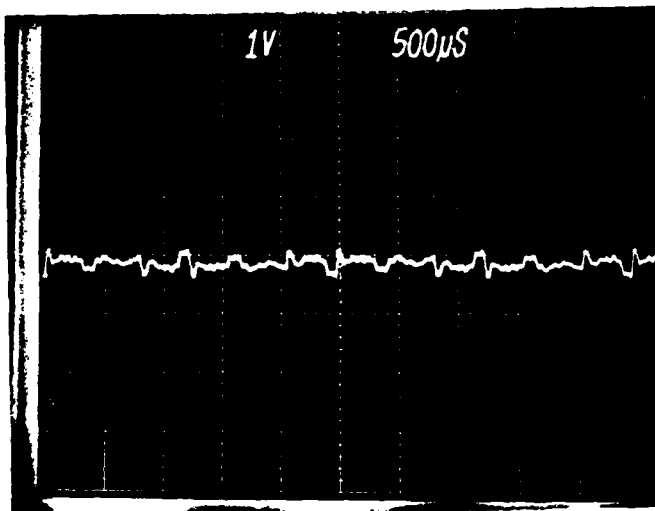
SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 4I 400Hz FL
DEVIATION

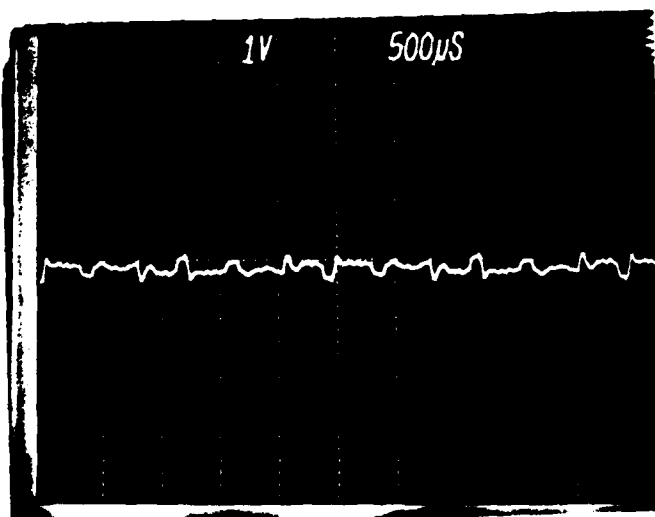
V1 VφA 10% DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4I
PIX NO. 4I 7g



V1 VφB 10% DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4I
PIX NO. 4I 7h

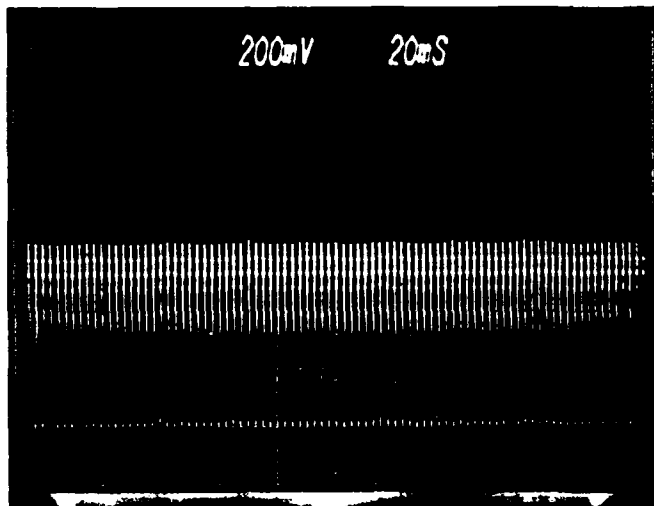


V1 VφC 10% DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4I
PIX NO. 4I 7i



SANTA BARBARA, CALIFORNIA

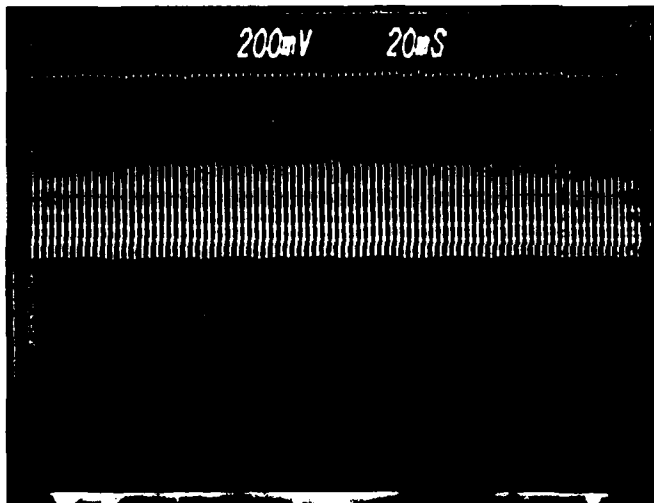


TEST DESCRIPTION 4I 400Hz FL

V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4I

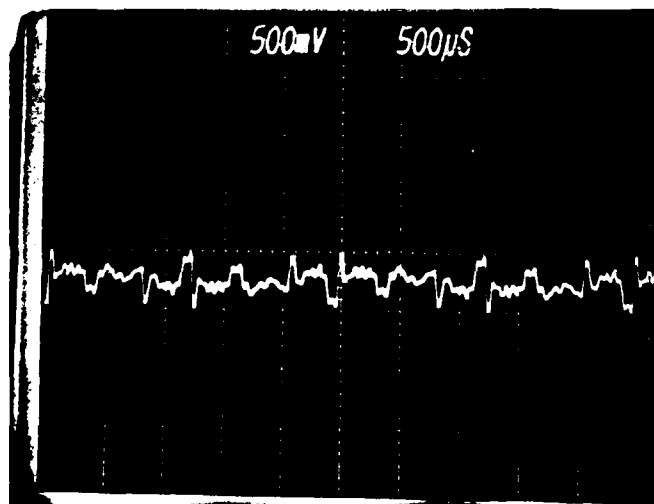
PIX NO. 4I 7j



V1 V ϕ A
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4I

PIX NO. 4I 7k



V1 V ϕ B 520/DIV
V2 _____
V3 _____
V4 _____
H1 _____
H2 _____

TEST NO. 4I

PIX NO. 4I 7h2

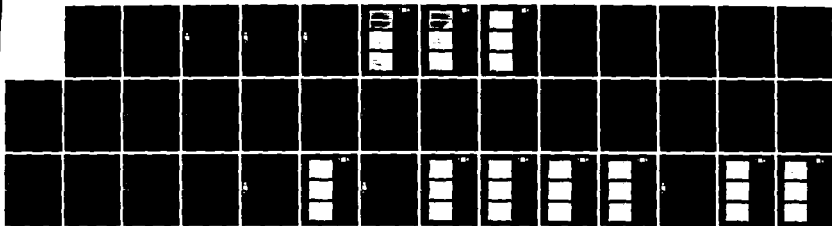
AD-A145 523

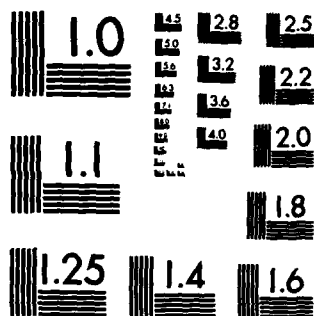
15KW GENERAL PURPOSE POWER CONDITIONER (FREQUENCY
CHANGER)(U) GENERAL MOTORS CORP GOLETA CA DELCO
ELECTRONICS DIV 26 SEP 80 R80-122 DAAK70-77-C-0157

UNCLASSIFIED

F/G 10/2

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

APPENDIX A

ADDITIONAL FREQUENCY CHANGER TESTING

Results of certain supplementary tests appear in this appendix. Tests are as follows:

1-Xa	Transient feedthru suppression
1-Xu	Input/output, output/input transients
4-Xa	Efficiency, 110V in, 110V out, 0.8 RL
4-Xb	Efficiency, 120V in, 120V out, 1.1 RL
4-Xc	Efficiency, 120V in, 120V out, 0.25 FL
4-Xd	Efficiency, 120V in, 120V out, 0.50 FL
4-Xe	Efficiency, 120 , 120 , 0.75 FL
4-Xf	Efficiency, 120 , 120 , FL
4-Xg	Losses , 114V in, 120V out, No load
4-Xh	Losses , 120 , 120 , No load
4-Xi	Losses , 126 , 120 , No load
4-Xj	Efficiency, 114V in, 120V out, 0.25 RL
4-Xk	Efficiency, 120 , 120 , 0.25 RL
4-Xl	Efficiency, 126 , 120 , 0.25 RL
4-Xm	Efficiency, 114 , 120 , 0.50RL
4-Xn	Efficiency, 120 , 120 , 0.50RL
4-Xo	Efficiency, 126 , 120 , 0.50RL
4-Xp	Efficiency, 114 , 120 , 0.75RL
4-Xq	Efficiency, 120 , 120 , 0.75RL
4-Xr	Efficiency, 126 , 120 , 0.75RL
4-Xs	Efficiency, 111 , 120 , RL
4-Xt	Efficiency, 114 , 120 , RL
4-Xu	Efficiency, 120 , 120 , RL
4-Xv	Efficiency, 126 , 120 , RL
4-Xw	Efficiency, 132 , 120 , RL
50 Hz	NL, 15 kW, 100 V _{out}
Distortion	50, 60, 400 Hz
Converter Perf.	Transients, I _{in} distortion

EQUIP DESCRIPTION

TEST NO.

SANTA BARBARA, CALIFORNIA

SHEET OF

MFGR

TEST DESCRIPTION 60HZ OUTPUT
TO 7KW 0.8PF, EFFECT
OF INPUT GLITCHES

DATE 1-21-80

PROJ ENGR G.H. Barrett

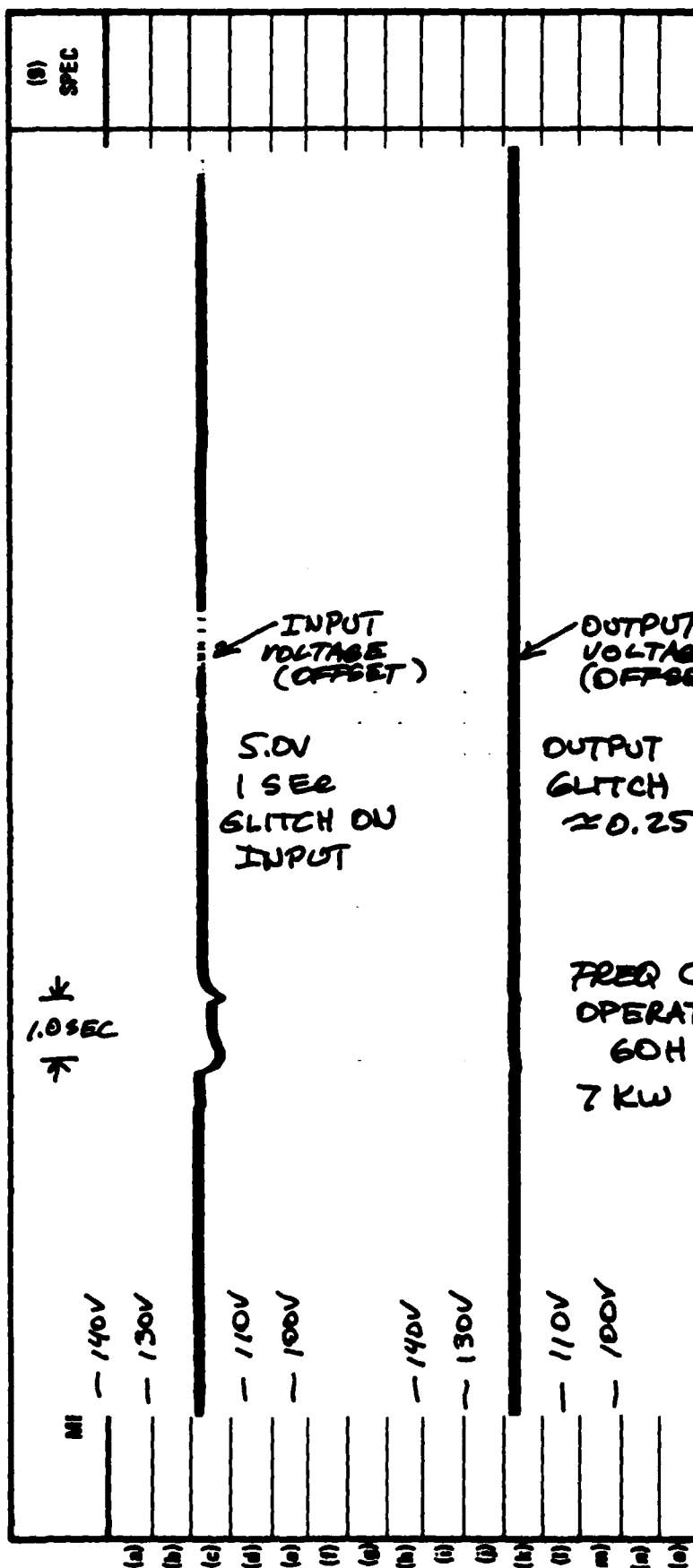
MODEL NO.

TEST BY G.H.B.

SERIAL NO.

OBSERVER

REF:



NOTES



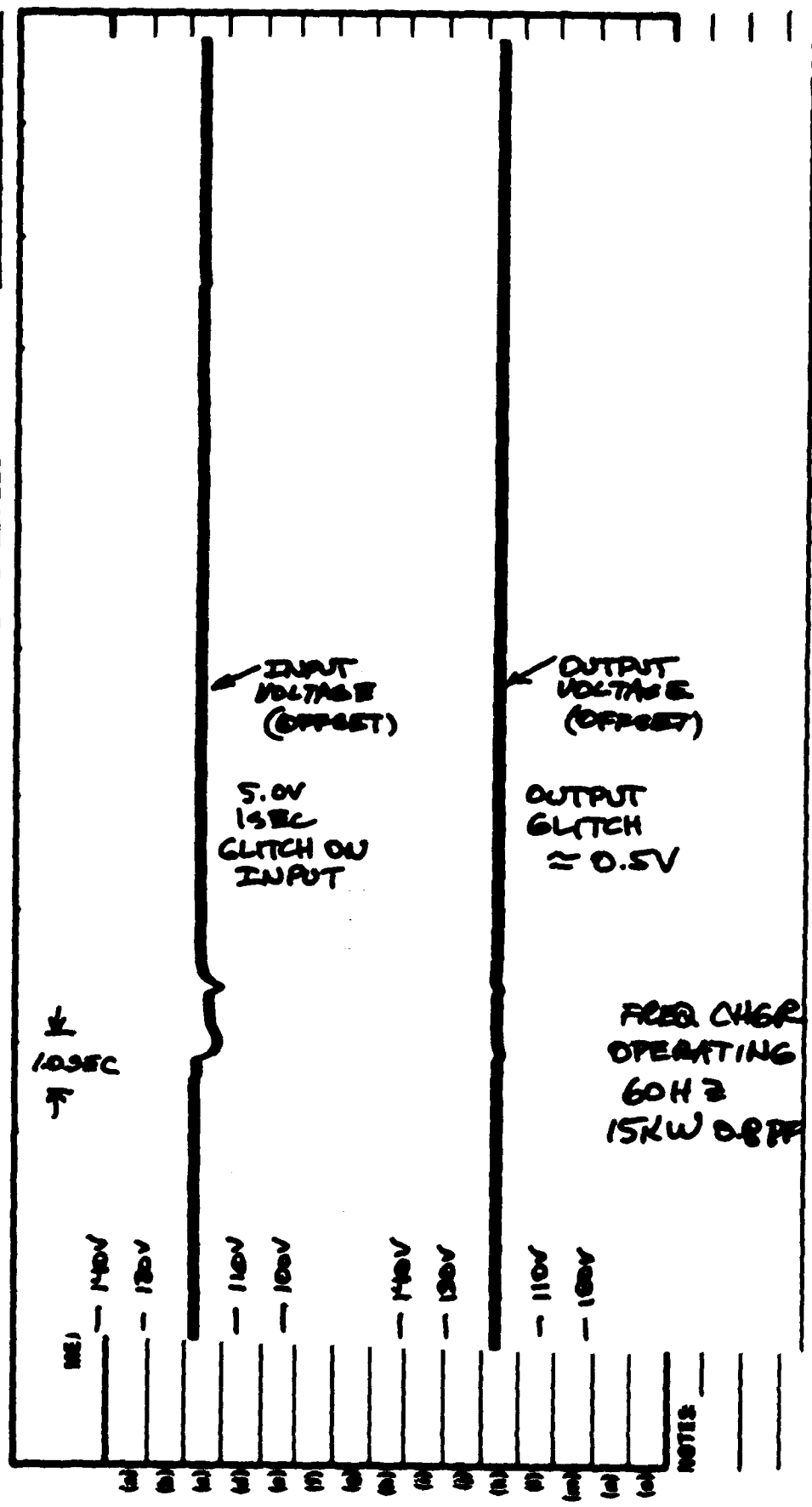
EQUIP DESCRIPTION

TEST NO. _____
SHEET _____ OF _____
DATE 1-21-80
PROJECTOR C.H. Bennett
TEST BY C.H.B.
OBSERVER _____

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 60Hz OUTPUT
TO RL, EFFECT OF
INPUT GLITCHES
REF: _____

MODEL NO. _____
SERIAL NO. _____





SANTA BARBARA CALIFORNIA

TEST NO. 1X2

— 133 —

30 DAY CHALLENGE

INVEST CHARGES ON DEBT

Letter to my sister

22

DATE 12-13-79

PROJENGA CH. Bond

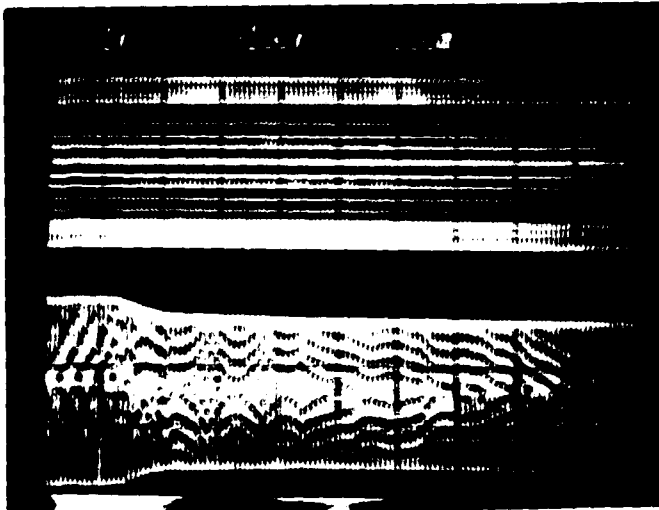
TEST BY Ed

REARVIEW MIRROR **J. WILLIAMS**

[illegible]

→ Sabana Esteel de Indagadores 77UP (set at 98mm)

~~POSITION EFFECT OF OVERNIGHT TRIP (SET AT 134VARS)~~



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT/OUTPUT
TRANSIENTS

V1 OUTPUT VOLTAGE 0.4 M

V2 INPUT VOLTAGE 0.4

V3 OUTPUT 120V RMS

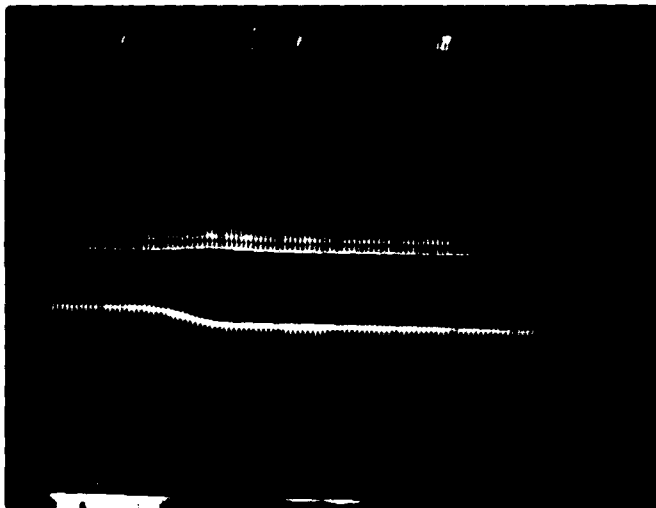
V4 INPUT 133V RMS - 2.1 M

V5 _____

V6 _____

TEST NO. _____

FIG NO. 1X1



V1 OUTPUT 0.4 M

V2 INPUT 0.4

V3 OUTPUT: 120V RMS

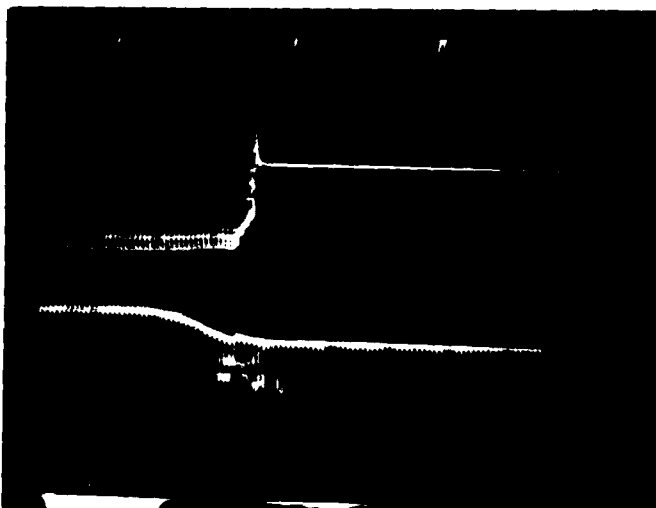
V4 INPUT: 133V RMS - 2.1 M

V5 _____

V6 _____

TEST NO. _____

FIG NO. 1X2



V1 OUTPUT 0.4 M

V2 INPUT 0.4

V3 INPUT: 120V RMS TO 0

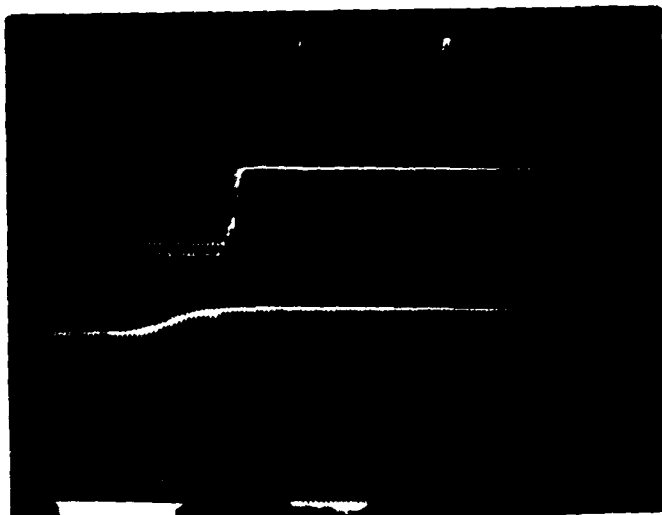
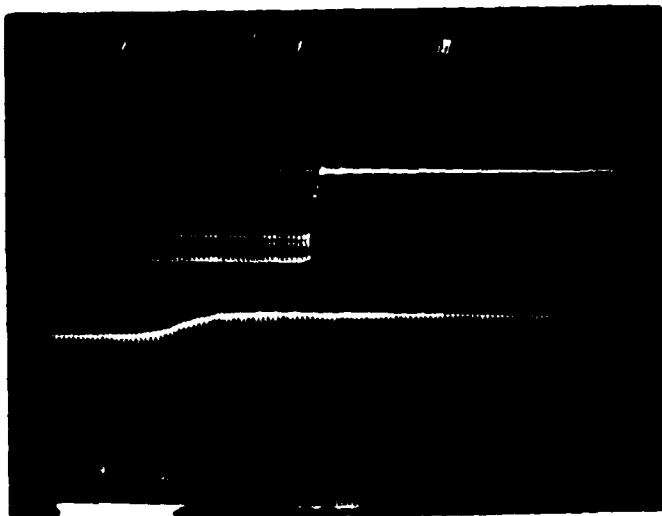
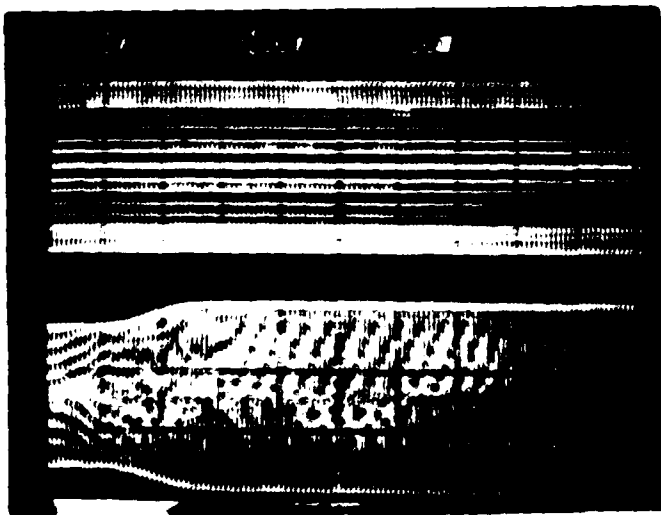
V4 INPUT: 133V RMS TO 90V

V5 (OUTPUT CONTR. OPENS

V6 FROM INPUT UNSTABLE)

TEST NO. _____

FIG NO. 1X3



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT/OUTPUT
TRANSIENTS

V1 OUTPUT V_{GA} NL

V2 INPUT V_{GA}

V3 OUTPUT: 120V RMS

V4 INPUT: 100V RMS - 0.15V

V5 _____

V6 _____

TEST NO. _____

PK NO. 1X4

V1 OUTPUT V_{GA} NL

V2 INPUT V_{GA}

V3 OUTPUT: 120V RMS TO 0

V4 INPUT: 100V RMS - 0.15V

V5 (OUTPUT CENTER OPEN)

V6 FROM INTERFERENCE

TEST NO. _____

PK NO. 1X5

V1 OUTPUT V_{GA} RL

V2 INPUT V_{GA}

V3 OUTPUT: 120V RMS TO 0

V4 INPUT: 100V RMS - 0.15V RMS

V5 (OUTPUT CENTER OPEN)

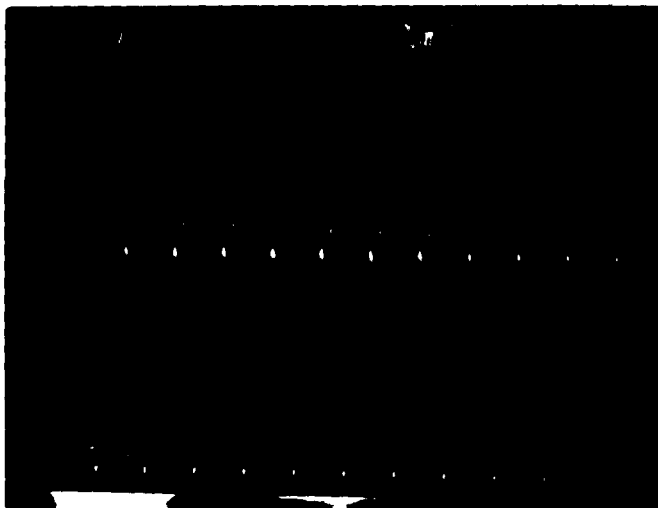
V6 FROM INTERFERENCE

TEST NO. _____

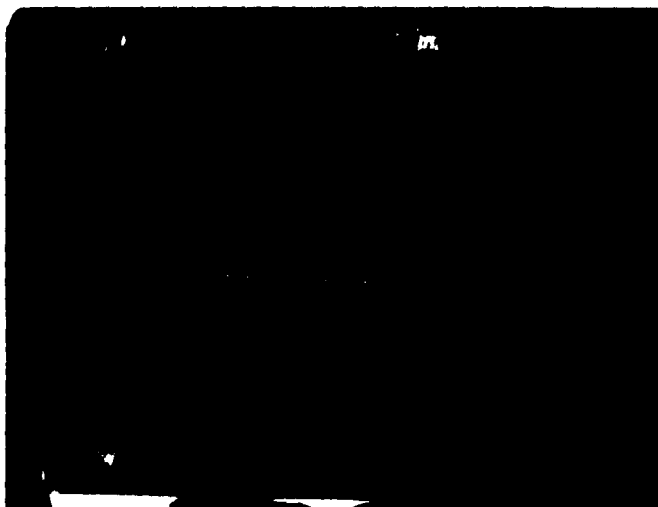
PK NO. 1X6



T



T



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION OUTPUT
INPUT TRANS. EUTS 6CH2

V1 VGA OUTPUT
 V2 VGA INPUT
 V3 _____
 V4 NL → RL
 M1 50ms/DIV
 M2 _____

TEST NO. _____
 PIX NO. 117

T

V1 VGA OUTPUT
 V2 VGA INPUT
 V3 _____
 V4 NL → RL 44 above
 M1 20ms/DIV
 M2 _____

TEST NO. _____
 PIX NO. 118

T

V1 VGA OUTPUT
 V2 INPUT 50A 10
 V3 _____
 V4 NL → RL
 M1 50ms/DIV
 M2 _____

TEST NO. _____
 PIX NO. 119



EQUIP DESCRIPTION

MEADCOM 15KW GEN'L

PROPOSE FREQUENCY CMC'S

WMA DELCO ELECTRONICS

WORK NO.

SERIAL NO.

REF.

TEST DESCRIPTION

SCHWZ 10KVOLT 110VTA

SANTA BARBARA, CALIFORNIA

TEST NO. 4-X-3

SHEET 1 OF 1

DATE 2-19-80

PROJECTOR A.H. BARRETT

TEST BY A.H. BARRETT

OBSERVER

(1) MEASUREMENT	(2) INST NO.	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATION/TIME	(7) FIXING	(8) PERCENT	(9) SPEC
VPA INPUT				110.0V				
VPB INPUT				102.9V				
VPC INPUT				118.5V				
IPA INPUT				48.41A				
IPB INPUT				50.03A				
IPC INPUT				48.78A				
POWER INPUT				16270W				
POWER OUTPUT				12300W				
VPA OUTPUT				118.7V				
VPB OUTPUT				110.6V				
VPC OUTPUT				110.9V				
IPA OUTPUT				48.35A				
IPB OUTPUT				48.12A				
IPC OUTPUT				47.84A				
EFFICIENCY				75.6%				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 8505/8514 WATTMETER WITH DELCO CURRENT LEADS AND TRANSFER SWITCH



EQUIP DESCRIPTION

TEST NO. 4-21
SHEET 1 OF 1

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION

DATE 2-18-80

INSTR

480H3 1.1 RL 120VAC

MEASURED A.H. BARRETT

MODEL NO.

TEST BY A.H. BARRETT

SERIAL NO.

OBSERVER

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MEASUREMENT	TEST NO.	RECORDED	CONC	MEASURED	CALCULATION	FIG NO.	PERF	SPEC
V _{PA} INPUT				17.9 V				
V _{PB} INPUT				17.3 V				
V _{PC} INPUT				12.3 V				
I _{PA} INPUT				60.6 A				
I _{PB} INPUT				60.7 A				
I _{PC} INPUT				57.3 A				
POWER INPUT				21570W				
POWER OUTPUT				16760W				
V _{PA} OUTPUT				17.9 V				
V _{PB} OUTPUT				17.9 V				
V _{PC} OUTPUT				17.8 V				
I _{PA} OUTPUT				56.41 A				
I _{PB} OUTPUT				56.33 A				
I _{PC} OUTPUT				56.82 A				
EFFICIENCY				76.3%				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 8505/8514 WATTMETER
WITH ZERO CURRENT XEMBS AND TRANSFER SWITCH



EQUIP DESCRIPTION
MERADOM 15KW GEN'L
PURPOSE FREQUENCY CMC R-
MGR DELCO ELECTRONICS 400HZ 14 FL 120VIA

TEST NO. 4-2
SHEET 1 OF 1
DATE 2-18-80
PROJECTOR A.H. BARRETT
TEST BY A.H. BARRETT
OBSERVER

TEST DESCRIPTION
MGR DELCO ELECTRONICS 400HZ 14 FL 120VIA

REF

(1) MEASUREMENT	(2) TEST NO.	(3) REQUIRED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/NOTES	(7) PIX NO.	(8) PERC	(9) SPEC
V _{PA} INPUT				119.6 V				
V _{PB} INPUT				119.8 V				
V _{PC} INPUT				120.9 V				
I _{PA} INPUT				20.30A				
I _{PB} INPUT				20.71A				
I _{PC} INPUT				20.14A				
POWER INPUT				7105W				
POWER OUTPUT				3808W				
V _{PA} OUTPUT				120.5 V				
V _{PB} OUTPUT				120.6 V				
V _{PC} OUTPUT				120.8 V				
I _{PA} OUTPUT				10.58 A				
I _{PB} OUTPUT				10.52 A				
I _{PC} OUTPUT				10.55 A				
EFFICIENCY				53.6 %				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 8505/8514 WATTMETER
WITH DELCO CURRENT LEADS AND TRANSFER SWITCH



EQUIP DESCRIPTION

MEADCOM 15KW GEN'L
PURPOSE FREQUENCY CMC'R
MFGR DELCO ELECTRONICS
MODEL NO.
SERIAL NO.

SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION

400HZ 1/2 FL 120VIA

TEST NO.
SHEET 1 OF 1
DATE 2-18-80
PROJ ENGR A.H. BARRETT
TEST BY A.H. BARRETT
OBSERVER

(1) MEASUREMENT	(2) TEST NO. IN	(3) RECORDS	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/NOTES	(7) FIXING	(8) PERF	(9) SPEC
V _{PA} INPUT				120.1 V				
V _{PB} INPUT				120.0 V				
V _{PC} INPUT				121.3 V				
I _{PA} INPUT				32.37 A				
I _{PB} INPUT				32.61 A				
I _{PC} INPUT				31.95 A				
POWER INPUT				11530 W				
POWER OUTPUT				7570 W				
V _{PA} OUTPUT				120.4 V				
V _{PB} OUTPUT				120.5 V				
V _{PC} OUTPUT				120.6 V				
I _{PA} OUTPUT				21.03 A				
I _{PB} OUTPUT				20.99 A				
I _{PC} OUTPUT				20.91 A				
EFFICIENCY		—		65.7%				

NOTES ALL MEASUREMENTS TAKEN ON YEW 8505/8514 WATTMETER
WITH DELCO CURRENT LEADS AND TRANSFER SWITCH

EQUIP DESCRIPTION

MERADOM 15KW GEN'L

PURPOSE FREQUENCY CMC'R

MFGA DELCO ELECTRONICS

MODEL NO.

SERIAL NO.

TEST DESCRIPTION

400HZ 3/4 FL 120V IN

SANTA BARBARA, CALIFORNIA

TEST NO.

SHEET

DATE

PROJECT

TEST BY

OBSERVER

(1) MEASUREMENT	(2) TEST NO. (A)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
V ϕ A INPUT				117.8 V				
V ϕ B INPUT				117.2 V				
V ϕ C INPUT				120.6 V				
I ϕ A INPUT				44.71 A				
I ϕ B INPUT				44.94 A				
I ϕ C INPUT				44.26 A				
POWER INPUT				16000 W				
POWER OUTPUT				11340 W				
V ϕ A OUTPUT				120.4 V				
V ϕ B OUTPUT				120.5 V				
V ϕ C OUTPUT				120.6 V				
I ϕ A OUTPUT				31.46 A				
I ϕ B OUTPUT				31.43 A				
I ϕ C OUTPUT				31.30 A				
EFFICIENCY				70.9 %				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 8505/2514 WATTMETER

WITH DELCO CURRENT XEPRS AND TRANSFER SWITCH



EQUIP DESCRIPTION

TEST NO. 4-29

SANTA BARBARA, CALIFORNIA

SHEET 1 OF 1

TEST DESCRIPTION

DATE 2-18-80

MFGR

400H2 NL 114VIN

PROJ ENGR A.H.B.

MODEL NO.

TEST BY A.H.B.

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) V ϕ A INPUT				114.1 V				
(b) V ϕ B INPUT				114.0 V				
(c) V ϕ C INPUT				114.9 V				
(d) I ϕ A INPUT				10.15 A				
(e) I ϕ B INPUT				9.78 A				
(f) I ϕ C INPUT				9.50 A				
(g) POWER INPUT				2681 W				
(h) POWER OUTPUT				— W				
(i) V ϕ A OUTPUT				120.5 V				
(j) V ϕ B OUTPUT				120.7 V				
(k) V ϕ C OUTPUT				120.8 V				
(l) I ϕ A OUTPUT				— A				
(m) I ϕ B OUTPUT				— A				
(n) I ϕ C OUTPUT				— A				
(o) EFFICIENCY		—		— %				

NOTES:

ALL MEASUREMENTS TAKEN ON YEW 8505/2514 WATTMETER
WITH DELCO CURRENT XEMRS AND TRANSFER SWITCH



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 4-18
SHEET 1 OF 1

TEST DESCRIPTION

400 Hz NL 120 VIN

MFGR

MODEL NO.

SERIAL NO.

REF:

DATE 2-18-80

PROJ ENGR A.H.B.

TEST BY A.H.B.

OBSERVER

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) V ϕ A INPUT				120.5 V				
(b) V ϕ B INPUT				120.8 V				
(c) V ϕ C INPUT				121.6 V				
(d) I ϕ A INPUT				10.18 A				
(e) I ϕ B INPUT				9.82 A				
(f) I ϕ C INPUT				9.58 A				
(g) POWER INPUT				2718 W				
(h) POWER OUTPUT				— W				
(i) V ϕ A OUTPUT				120.5 V				
(j) V ϕ B OUTPUT				120.7 V				
(k) V ϕ C OUTPUT				120.8 V				
(l) I ϕ A OUTPUT				— A				
(m) I ϕ B OUTPUT				— A				
(n) I ϕ C OUTPUT				— A				
(o) EFFICIENCY				— %				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 8505/2514 WATTMETER
WITH DELCO CURRENT XEMRS AND TRANSFER SWITCH



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO. 4-18-80

SHEET 1 OF 1

TEST DESCRIPTION

DATE 2-18-80

MFGR

400HZ NL 126VIN

PROJ ENGR A.H.B.

MODEL NO.

TEST BY A.H.B.

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) V ϕ A INPUT				126.3 V				
(b) V ϕ B INPUT				126.5 V				
(c) V ϕ C INPUT				127.6 V				
(d) I ϕ A INPUT				10.34 A				
(e) I ϕ B INPUT				9.98 A				
(f) I ϕ C INPUT				9.80 A				
(g) POWER INPUT				2752W				
(h) POWER OUTPUT				— W				
(i) V ϕ A OUTPUT				120.5 V				
(j) V ϕ B OUTPUT				120.7 V				
(k) V ϕ C OUTPUT				120.8 V				
(l) I ϕ A OUTPUT				— A				
(m) I ϕ B OUTPUT				— A				
(n) I ϕ C OUTPUT				— A				
(o) EFFICIENCY				— %				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 8505/2514 WATTMETER
WITH DELCO CURRENT XEMRS AND TRANSFER SWITCH



EQUIP DESCRIPTION _____

SANTA BARBARA, CALIFORNIA

TEST NO. 4-V

SHEET 1 OF 1

DATE 2-18-80

PROJ ENGR A.H.B.

TEST BY A.H.B.

OBSERVER _____

TEST DESCRIPTION

400Hz 1/4 RL 114VIN

MFGR _____

MODEL NO. _____

SERIAL NO. _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) $V_{\phi A}$ INPUT				114.2 V				
(b) $V_{\phi B}$ INPUT				113.9 V				
(c) $V_{\phi C}$ INPUT				115.2 V				
(d) $I_{\phi A}$ INPUT				20.30 A				
(e) $I_{\phi B}$ INPUT				20.26 A				
(f) $I_{\phi C}$ INPUT				19.71 A				
(g) POWER INPUT				6641 W				
(h) POWER OUTPUT				3678 W				
(i) $V_{\phi A}$ OUTPUT				120.4 V				
(j) $V_{\phi B}$ OUTPUT				120.6 V				
(k) $V_{\phi C}$ OUTPUT				120.6 V				
(l) $I_{\phi A}$ OUTPUT				13.09 A				
(m) $I_{\phi B}$ OUTPUT				13.09 A				
(n) $I_{\phi C}$ OUTPUT				13.14 A				
(o) EFFICIENCY		—		55.4 %				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 850S/8514 WATTMETER

WITH DELCO CURRENT XEMRS AND TRANSFER SWITCH

EQUIP DESCRIPTION

TEST NO.

SANTA BARBARA, CALIFORNIA

SHEET

1 OF 1

TEST DESCRIPTION

DATE

MFR

400H2 1/4 RL 120 V 1N

PROJECTOR A.H.B.

MODEL NO.

TEST BY

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO. (A)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/NOTES	(7) PIX NO.	(8) PERF	(9) SPEC
V ϕ A INPUT				120.4 V				
V ϕ B INPUT				120.1 V				
V ϕ C INPUT				121.5 V				
I ϕ A INPUT				19.68 A				
I ϕ B INPUT				19.51 A				
I ϕ C INPUT				19.04 A				
POWER INPUT				66.85 W				
POWER OUTPUT				36.77 W				
V ϕ A OUTPUT				120.4 V				
V ϕ B OUTPUT				120.6 V				
V ϕ C OUTPUT				120.6 V				
I ϕ A OUTPUT				13.09 A				
I ϕ B OUTPUT				13.09 A				
I ϕ C OUTPUT				13.14 A				
EFFICIENCY				55.0%				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 8505/8514 WATTMETER
WITH TRACO CURRENT LEADS AND TRANSFORMER SWITCH



SANTA BARBARA, CALIFORNIA

EQUIP DESCRIPTION

TEST NO. 4-11

SHEET 1 OF 1

TEST DESCRIPTION

DATE 2-18-80

PROJECTOR A.H.B.

TEST BY A.H.B.

OBSERVER

Y000H3 1/4 RL 1346VIA

INSTR

MODEL NO.

SERIAL NO.

REF.

(1) MEASUREMENT	(2) INST NO. (A)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATION AND TIME	(7) PWR DG	(8) PEAK	(9) SPEC
V _{OA} INPUT				126.6 V				
V _{OB} INPUT				125.8 V				
V _{OC} INPUT				127.2 V				
I _{OA} INPUT				19.43 A				
I _{OB} INPUT				18.93 A				
I _{OC} INPUT				18.90 A				
POWER INPUT				6787 W				
POWER OUTPUT				3676 W				
V _{OA} OUTPUT				120.4 V				
V _{OB} OUTPUT				120.5 V				
V _{OC} OUTPUT				120.5 V				
I _{OA} OUTPUT				13.00 A				
I _{OB} OUTPUT				13.10 A				
I _{OC} OUTPUT				13.14 A				
EFFICIENCY		—		54.6 %				

NOTES ALL MEASUREMENTS TAKEN ON YEW 8505/8514 WATTMETER
WITH TRACO CURRENT XEMRS AND TRANSFER SWITCH



EQUIP DESCRIPTION

SANTA BARBARA, CALIFORNIA

TEST NO

SHEET 1 OF 1

TEST DESCRIPTION

DATE 2-18-80

MPER

40063 1/2 RL NY VIN

MODEL NO.

PROJ NO 44.3

SERIAL NO.

TEST BY 44.3

REF:

OBSERVER

(1) MEASUREMENT	(2) INST NO. (4)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATION/NOTES	(7) REC NO	(8) PLAN	(9) SPEC
V _{OA} INPUT				113.8 V				
V _{OB} INPUT				113.6 V				
V _{OC} INPUT				114.8 V				
I _{OA} INPUT				31.98 A				
I _{OB} INPUT				32.10 A				
I _{OC} INPUT				31.45 A				
POWER INPUT				10770 W				
POWER OUTPUT				7280 W				
V _{OA} OUTPUT				120.3 V				
V _{OB} OUTPUT				120.5 V				
V _{OC} OUTPUT				120.5 V				
I _{OA} OUTPUT				26.41 A				
I _{OB} OUTPUT				26.39 A				
I _{OC} OUTPUT				26.25 A				
EFFICIENCY				68.5 %				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 8505/8514 UNIT/TESTER WITH TRACER CURRENT LEADS AND TRANSFER SWITCH



EQUIP DESCRIPTION

SANTA BARBARA ELECTRONICS

TEST NO. 101
DATE 2-18-60
TEST BY A M B
CORRECTOR

TEST DESCRIPTION
Y807's 1/2 RL 120V IN
REF:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
MEASUREMENT	INST	RECORDED	CORR	MEASURED	CALCULATED	PER	PER	PER	PER
V _{PA} INPUT				120.5 V					
V _{PB} INPUT				120.1 V					
V _{PC} INPUT				121.0 V					
I _{PA} INPUT				20.55 A					
I _{PB} INPUT				20.69 A					
I _{PC} INPUT				29.94 A					
POWER INPUT				10620 W					
POWER OUTPUT				7300 W					
V _{PA} OUTPUT				120.3 V					
V _{PB} OUTPUT				120.5 V					
V _{PC} OUTPUT				120.5 V					
I _{PA} OUTPUT				26.41 A					
I _{PB} OUTPUT				26.30 A					
I _{PC} OUTPUT				26.25 A					
EFFICIENCY				68.2 %					

NOTE: ALL MEASUREMENTS TAKEN ON Y8W B505/05.4 WATTMETER
WITH TRACED CURRENT LEADS AND TRANSFER SWITCH



COMP DESCRIPTION

TEST NO. 4-13
SHEET 1 of 1
DATE 2-18-80
MANUFACT. 0418
TEST BY JMB
CONTRACT

TEST DESCRIPTION
400W/3 1/2A 126V/1A

MPA

MODEL NO.

SERIAL NO.

REF

(1)	MEASUREMENT	(2)	UNIT	(3)	MEASUREMENT	(4)	UNIT	(5)	UNIT	(6)	UNIT
	V _{PA} INPUT				126.1 V						
	V _{PB} INPUT				125.7 V						
	V _{PC} INPUT				127.0 V						
	I _{PA} INPUT				22.51 A						
	I _{PB} INPUT				22.46 A						
	I _{PC} INPUT				22.86 A						
	POWER INPUT				10900 W						
	POWER OUTPUT				7380 W						
	V _{PA} OUTPUT				120.2 V						
	V _{PB} OUTPUT				120.4 V						
	V _{PC} OUTPUT				120.4 V						
	I _{PA} OUTPUT				26.70 A						
	I _{PB} OUTPUT				26.70 A						
	I _{PC} OUTPUT				26.25 A						
	EFFICIENCY				67.0 %						

NOTES: ALL MEASUREMENTS TAKEN ON YAW POSITIVE/0.5V UNITS WITH
WITH DASE CURRENT SENS AND TRANSFER SWITCH



EQUIP DESCRIPTION

TEST NO. 101
DATE 1/05/1
DATE 2-0-80
PRODUCTION A.M.B.
TEST BY A.M.B.
COURTESY

TEST DESCRIPTION
Y200A 3Y BL 11422V
REF.

MODEL NO.
SERIAL NO.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
MEASUREMENT	TEST NO.	RECORDS	CONV. FACTOR	MEASURED	CALCULATED	OUT NO.	IN	OUT	SPC
V _{DA} INPUT				113.7 V					
V _{DB} INPUT				113.5 V					
V _{DC} INPUT				114.3 V					
I _{DA} INPUT				45.37 A					
I _{DB} INPUT				45.76 A					
I _{DC} INPUT				44.72 A					
POWER INPUT				19720 W					
POWER OUTPUT				11360 W					
V _{DA} OUTPUT				120.2 V					
V _{DB} OUTPUT				120.6 V					
V _{DC} OUTPUT				120.4 V					
I _{DA} OUTPUT				38.51 A					
I _{DB} OUTPUT				39.57 A					
I _{DC} OUTPUT				39.70 A					
EFFICIENCY				73.7 %					

NOTE: ALL MEASUREMENTS TAKEN ON YEW B505/0514 WITH METEN
WITH TRACED CURRENT LEADS AND TRANSFER SWITCH



EQUIP DESCRIPTION

TEST NO. 1
DATE 1-1-80
TESTER 4-11-80
REVIEWER 4-11-80
SIGNED

TEST DESCRIPTION

SWITCH 34 BL 120V

MODEL NO.

SERIAL NO.

REF.

IN	MEASUREMENT	IN	INSTR	IN	RECORDED	IN	DATA	IN	RECORDED	IN	CALCULATION	IN	RECORDED	IN	RECORDED	IN	RECORDED
101	V _{PA} INPUT																
102	V _{PD} INPUT																
103	V _{PC} INPUT																
104	I _{PA} INPUT																
105	I _{PD} INPUT																
106	I _{PC} INPUT																
107	POWER INPUT																
108	POWER OUTPUT																
109	V _{PA} OUTPUT																
110	V _{PD} OUTPUT																
111	V _{PC} OUTPUT																
112	I _{PA} OUTPUT																
113	I _{PD} OUTPUT																
114	I _{PC} OUTPUT																
115	EFFICIENCY																

NOTE: ALL MEASUREMENTS TAKEN ON YEW B505/8514 WHITTAKER
WITH TRACED CURRENT LEADS AND TRANSFER SWITCH



COMP DESCRIPTION

TEST NO 1

SANTA BARBARA, CALIFORNIA

SHEET 1 OF 1

TEST DESCRIPTION

DATE 2-18-60

WGA

WOM2 3494 126VIN

PROD LISA A.H.B.

MODEL NO.

TEST BY A.H.B.

SERIAL NO.

OPERATOR

REF.

(1) MEASUREMENT	(2) INST NO. (a)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATED CORRECTION	(7) RIZ NO	(8) RET	(9) SPEC
V _{PA} INPUT				135.9 V				
V _{PB} INPUT				135.3 V				
V _{PC} INPUT				132.0 V				
I _{PA} INPUT				41.49 A				
I _{PB} INPUT				41.64 A				
I _{PC} INPUT				41.09 A				
POWER INPUT				5530 W				
POWER OUTPUT				11860 W				
V _{PA} OUTPUT				120.2 V				
V _{PB} OUTPUT				120.6 V				
V _{PC} OUTPUT				120.3 V				
I _{PA} OUTPUT				29.51 A				
I _{PB} OUTPUT				29.53 A				
I _{PC} OUTPUT				29.70 A				
EFFICIENCY		—		73.2%				

NOTES: ALL MEASUREMENTS TAKEN ON YAW 8505/8514 UNATTACHED WITH TRACED CURRENT SENSORS AND TRANSFER SWITCH



SANTA BARBARA, CALIFORNIA

EQUIP DESCRIPTION

TEST NO

SHEET

DATE

PROJECT

TEST BY

OBSERVER

TEST DESCRIPTION

400A3 RL 111V1N

MODEL NO.

SERIAL NO.

REF

(1) MEASUREMENT	(2) INST NO. (U)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/NOTES	(7) PUL NO	(8) PER	(9) SPEC
V _{PA} INPUT				111.5 V				
V _{PB} INPUT				111.0 V				
V _{PC} INPUT				112.0 V				
I _{PA} INPUT				58.24 A				
I _{PB} INPUT				58.10 A				
I _{PC} INPUT				57.85 A				
POWER INPUT				19460W				
POWER OUTPUT				14740W				
V _{PA} OUTPUT				121.3 V				
V _{PB} OUTPUT				121.3 V				
V _{PC} OUTPUT				121.5 V				
I _{PA} OUTPUT				52.94 A				
I _{PB} OUTPUT				52.63 A				
I _{PC} OUTPUT				52.40 A				
EFFICIENCY				75.8%				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 850S/8514 WATTMETER

WITH DELCO CURRENT XEMRS AND TRANSFER SWITCH

100

●

Abstract

100

THE UNIVERSITY OF CHICAGO

1990

10

一、

(1) MEASUREMENT	(2) INST NO. (a)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATED CORRECTION	(7) PWA. SUB	(8) PCT. OF	(9) SPEC
V ϕ A INPUT				113.9 V				
V ϕ B INPUT				114.3 V				
V ϕ C INPUT				115.2 V				
I ϕ A INPUT				56.63 A				
I ϕ B INPUT				57.60 A				
I ϕ C INPUT				56.65 A				
POWER INPUT				19510 W				
POWER OUTPUT				14750 W				
V ϕ A OUTPUT				121.4 V				
V ϕ B OUTPUT				121.4 V				
V ϕ C OUTPUT				121.5 V				
I ϕ A OUTPUT				53.15 A				
I ϕ B OUTPUT				52.93 A				
I ϕ C OUTPUT				52.88 A				
EFFICIENCY		—		75.6 %				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 2505/2514 WATTMETER

WITH DELCO CURRENT XEMRS AND TRANSFER SWITCH



EQUIP DESCRIPTION

TEST NO. 4-16

SHEET 1 OF 1

DATE 2-18-80

PROJ ENGR A.H. BARRETT

TEST BY A.H.B.

OBSERVER

TEST DESCRIPTION

400H3 PL 120 VIN

MFGR

MODEL NO.

SERIAL NO.

REF:

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) $V_{\phi A}$ INPUT				120.2 V				
(b) $V_{\phi B}$ INPUT				120.0 V				
(c) $V_{\phi C}$ INPUT				121.2 V				
(d) $I_{\phi A}$ INPUT				54.01 A				
(e) $I_{\phi B}$ INPUT				54.41 A				
(f) $I_{\phi C}$ INPUT				53.52 A				
(g) POWER INPUT				19460 W				
(h) POWER OUTPUT				14750 W				
(i) $V_{\phi A}$ OUTPUT				121.4 V				
(j) $V_{\phi B}$ OUTPUT				121.4 V				
(k) $V_{\phi C}$ OUTPUT				121.5 V				
(l) $I_{\phi A}$ OUTPUT				53.12 A				
(m) $I_{\phi B}$ OUTPUT				52.92 A				
(n) $I_{\phi C}$ OUTPUT				52.87 A				
(o) EFFICIENCY		—		75.8%				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 2505/2514 WATTMETER
WITH DELCO CURRENT XEMRS AND TRANSFER SWITCH



EQUIP DESCRIPTION _____

SANTA BARBARA, CALIFORNIA

TEST NO. 4-KV

SHEET 1 OF 1

TEST DESCRIPTION

400H3 RL 126 VIN

DATE 2-18-80

PROJ ENGR A.H.B.

TEST BY A.H.B.

OBSERVER _____

MFGR _____

MODEL NO. _____

SERIAL NO. _____

REF: _____

(1) MEASUREMENT	(2) INST NO.(s)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) $V\phi A$ INPUT				125.8 V				
(b) $V\phi B$ INPUT				125.6 V				
(c) $V\phi C$ INPUT				126.8 V				
(d) $I\phi A$ INPUT				51.79 A				
(e) $I\phi B$ INPUT				52.11 A				
(f) $I\phi C$ INPUT				51.36 A				
(g) POWER INPUT				19510 W				
(h) POWER OUTPUT				14740 W				
(i) $V\phi A$ OUTPUT				121.4 V				
(j) $V\phi B$ OUTPUT				121.4 V				
(k) $V\phi C$ OUTPUT				121.5 V				
(l) $I\phi A$ OUTPUT				53.17 A				
(m) $I\phi B$ OUTPUT				52.91 A				
(n) $I\phi C$ OUTPUT				52.81 A				
(o) EFFICIENCY		—		75.6 %				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 2505/2514 WATTMETER
WITH DELCO CURRENT XEMRS AND TRANSFER SWITCH



EQUIP DESCRIPTION

TEST NO. 4

SANTA BARBARA, CALIFORNIA

SHEET 1 OF 1

TEST DESCRIPTION

DATE 2-18-80

MEGR

400H2 RL 132 VIN

PROJ ENGR A.H.B.

MODEL NO.

TEST BY A.H.B.

SERIAL NO.

OBSERVER

REF:

(1) MEASUREMENT	(2) INST NO.(6)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) V ϕ A INPUT				131.9 V				
(b) V ϕ B INPUT				131.5 V				
(c) V ϕ C INPUT				133.1 V				
(d) I ϕ A INPUT				49.60 A				
(e) I ϕ B INPUT				49.71 A				
(f) I ϕ C INPUT				49.14 A				
(g) POWER INPUT				19570 W				
(h) POWER OUTPUT				14730 W				
(i) V ϕ A OUTPUT				121.2 V				
(j) V ϕ B OUTPUT				121.2 V				
(k) V ϕ C OUTPUT				121.5 V				
(l) I ϕ A OUTPUT				52.91 A				
(m) I ϕ B OUTPUT				52.61 A				
(n) I ϕ C OUTPUT				52.39 A				
(o) EFFICIENCY		—		75.5 %				

NOTES: ALL MEASUREMENTS TAKEN ON YEW 2505/2514 WATTMETER
WITH DELCO CURRENT XEARS AND TRANSFER SWITCH



EQUIP DESCRIPTION _____

SANTA BARBARA, CALIFORNIA

TEST NO. 50 H 2

SHEET 1 OF 1

TEST DESCRIPTION 50 H 2

DATE 12-14-79

MFGR _____

PROJ ENGR A.H. BART

MODEL NO. _____

TEST BY G.H.B.

SERIAL NO. _____

OBSERVER R. WILLIAMS

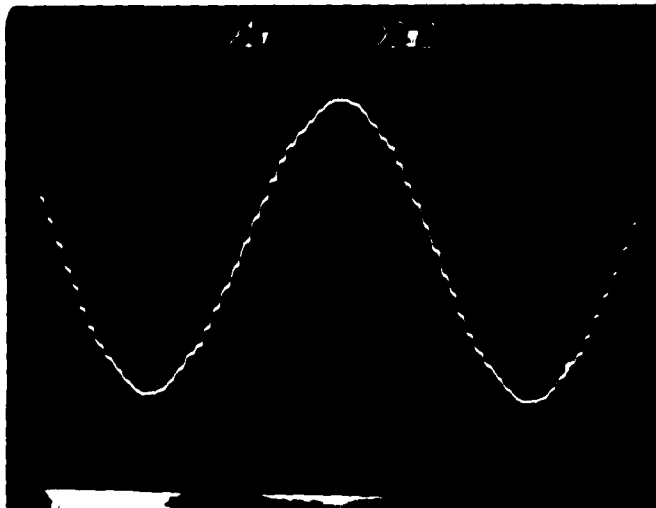
REF: _____

(1) MEASUREMENT	(2) INST NO. (a)	(3) RECORDED	(4) CORR FACTOR	(5) MEASURED	(6) CALCULATIONS/OTHER	(7) PIX NO.	(8) PERF	(9) SPEC
(a) OUTPUT ϕ A VOLTAGE	THP	2.60%			NO LOAD 100V RMS	SD-1		
(b)		3.55%			15KW 0.96 PF 100V	SD-2		
(c)		4.70%			15KW 0.93 PF 100V	SD-3		
(d)								
(e)								
(f)								
(g)								
(h)								
(i)								
(j)								
(k)								
(l)								
(m)								
(n)								
(o)								

NOTES: _____



SANTA BARBARA, CALIFORNIA



TEST DESCRIPTION 50 H 2

WAVEFORMS

V1 NO LOAD 100VRMS

W THD = 2.60%

W

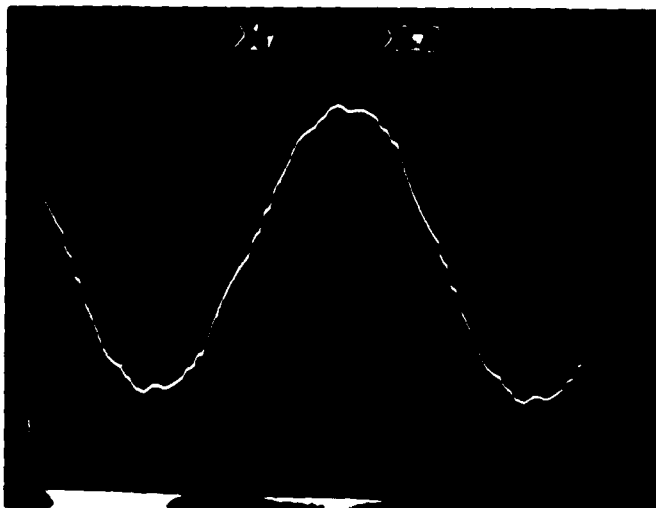
W

H1

H2

TEST NO.

PIX NO. 50-1



V1 15KW 100VRMS

W PF = 0.96 LAGGING

W THD = 3.55%

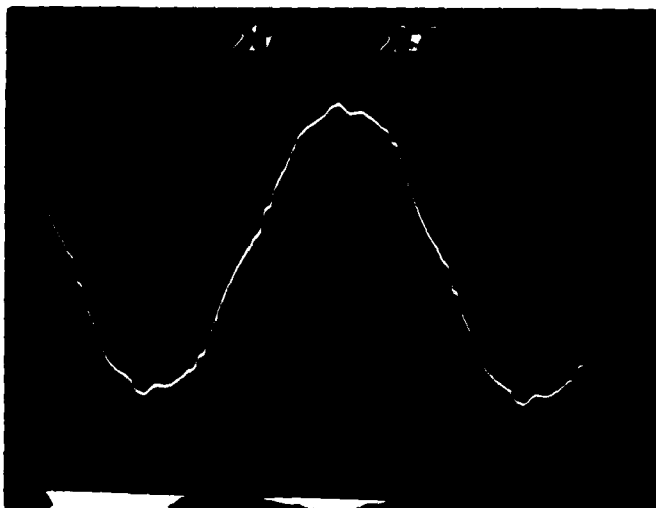
W

H1

H2

TEST NO.

PIX NO. 50-2



V1 15KW 100VRMS

W PF = 0.93 LAGGING

W THD = 4.70%

W

H1

H2

TEST NO.

PIX NO. 50-3



SANTA BARBARA, CALIFORNIA

TEST NO. DIS 370247014.

一、五、三

TEST DESCRIPTION 1971

SP-13 DISTRICT DIRECTOR

DISTINCTION AT 150 YEARS

2

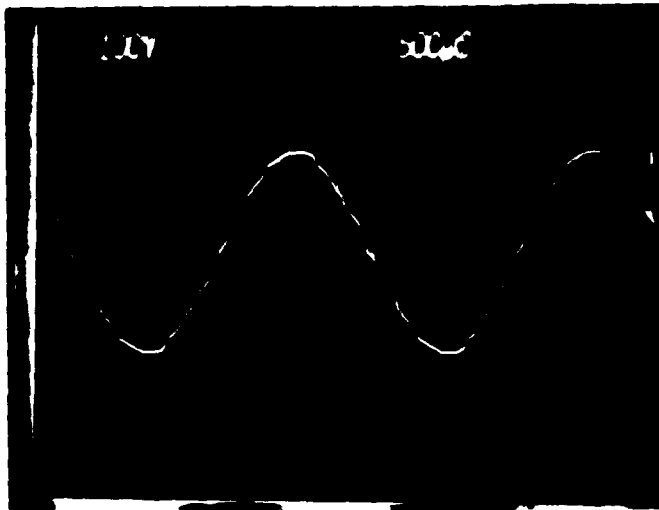
131

SECRET

三、

[illegible]

NOTES INTERESTING (WITHOUT COMMENT OR ITS ALTERNET CAPS) BEING DELETED BY MASTER/
SLAVE HP POWER SUPPLIES ADJUSTED FOR OUTPUT SPECIFIED ABOVE.
COMMON OF THE HP SUPPLIES IS ELGATTAKA (I.E. NOT GROUNDING OR
CONNECTED TO INPUTTING OUTPUT NEUTRAL)



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION DIV 400V
OUTPUT

V1 VA-N 120Vrms

V2 NO LOAD

V3 TDR = 2.45%

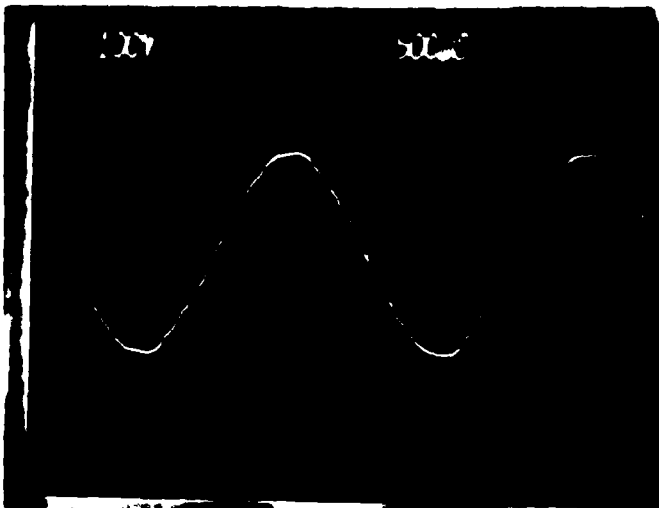
V4 _____

V5 _____

V6 _____

TEST NO. _____

PIX NO. 11-7-1



V1 VA-N 120Vrms

V2 12.2KW 0.8PF

V3 TDR = 2.35%

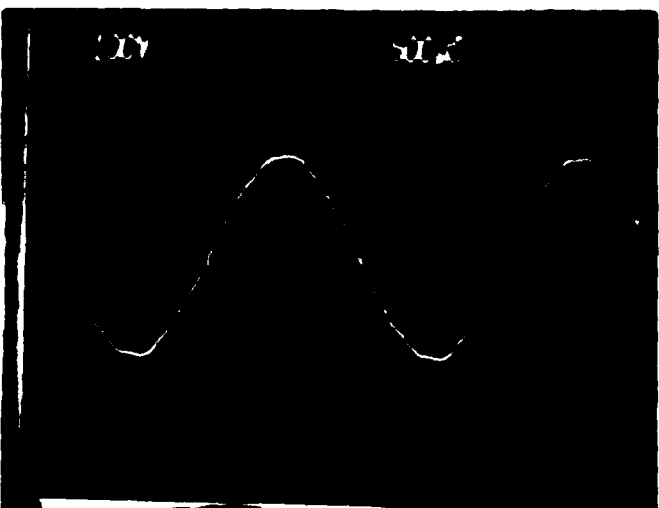
V4 _____

V5 _____

V6 _____

TEST NO. _____

PIX NO. 11-7-2



V1 VA-N 120Vrms

V2 12.2KW 0.8PF

V3 TDR = 2.45%

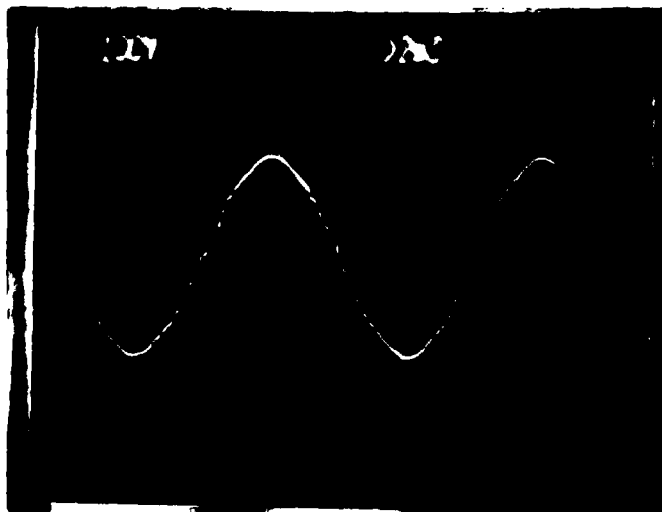
V4 _____

V5 _____

V6 _____

TEST NO. _____

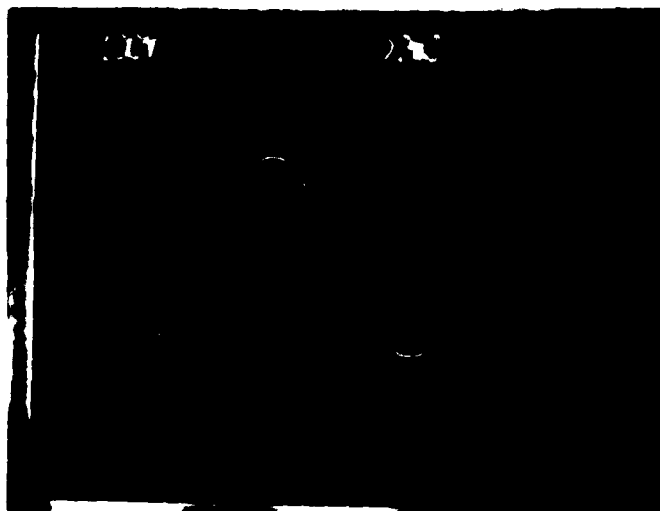
PIX NO. 11-7-3



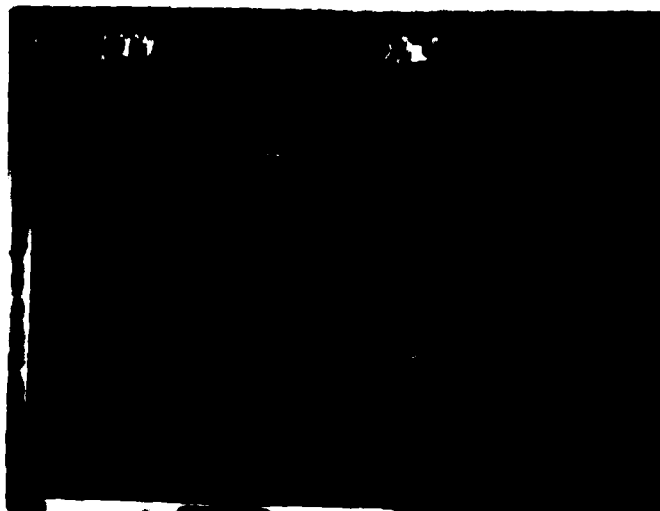
SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION ENV 60Hz
OUTPUT

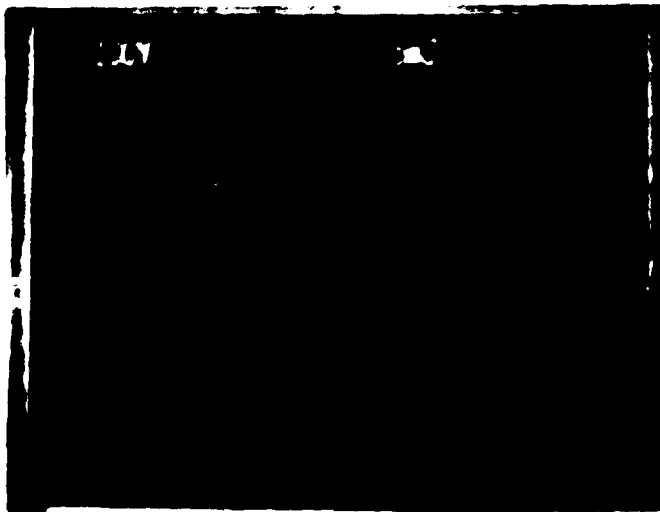
V1 VA-N 120VRMS
V2 NO LOAD
V3 THD = 2.47%
V4 _____
V5 _____
V6 _____
V7 _____
V8 _____
TEST NO. _____
PTR NO. 11-B-1



V1 VA-N 120VRMS
V2 12.3KW ABPF
V3 THD = 2.20%
V4 _____
V5 _____
V6 _____
V7 _____
V8 _____
TEST NO. _____
PTR NO. 11-B-2



V1 VA-N 120VRMS
V2 12.2KW 1.0PF
V3 THD = 2.09%
V4 _____
V5 _____
V6 _____
V7 _____
V8 _____
TEST NO. _____
PTR NO. 11-B-3



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION ENV SOUND

OUTPUT

V1 VA-N 110VRMS

V2 9L

V3 TMR = 2.51%

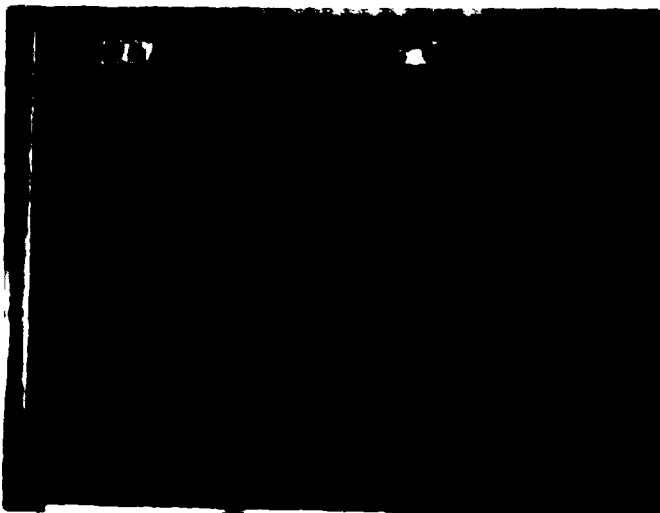
V4 _____

V5 _____

V6 _____

TEST NO. _____

PRG NO. 11-R-4



V1 VA-N 110VRMS

V2 10.2KW 2.00%

V3 TMR = 2.18%

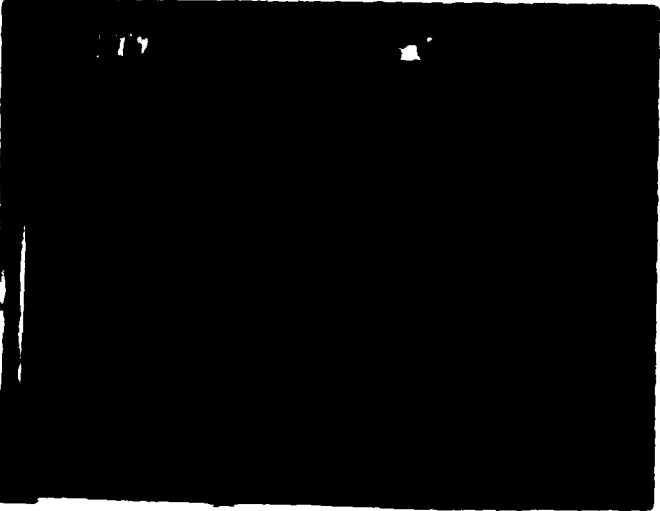
V4 _____

V5 _____

V6 _____

TEST NO. _____

PRG NO. 11-R-5



V1 VA-N 110VRMS

V2 10.2KW 1.00%

V3 TMR = 2.03%

V4 _____

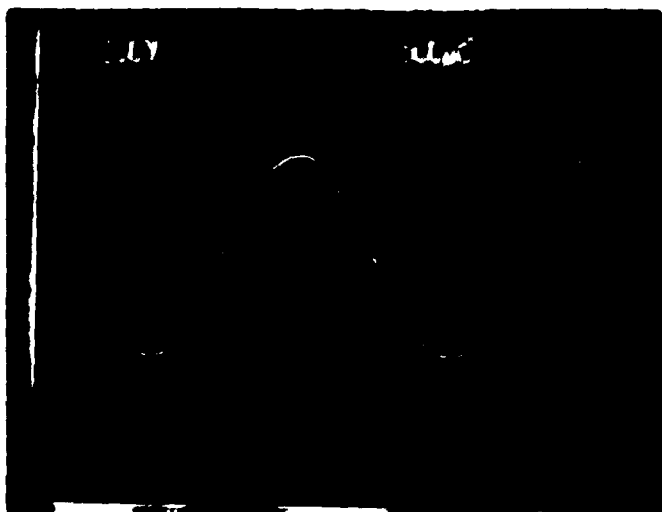
V5 _____

V6 _____

TEST NO. _____

PRG NO. 11-R-6

A-35

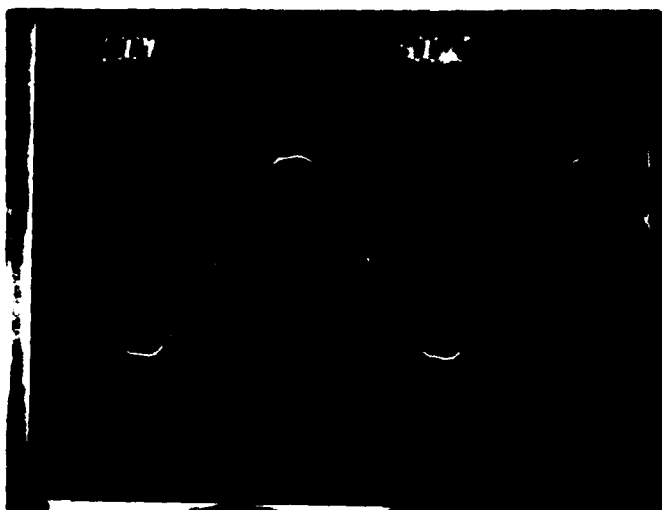


SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION INPUT

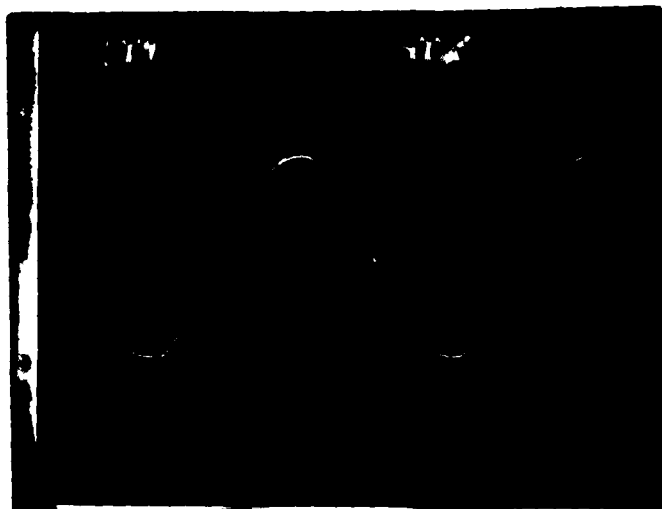
V1 120V RMS
 V2 NO LOAD
 V3 THD = 2.45%
 V4
 V5
 V6

TEST NO.
 PR NO. 11-7-1A (REPT)



V1 120V RMS
 V2 12.2kW OR PP
 V3 THD = 2.45%
 V4
 V5
 V6

TEST NO.
 PR NO. 11-7-2A (REPT)



V1 120V RMS
 V2 12.2kW 1.0PP
 V3 THD = 2.42%
 V4
 V5
 V6

TEST NO.
 PR NO. 11-7-4



FREQUENCY CHANGES
15 JUL 62

25

2000

2000

**THE COMMON CARROT
PICTURES**

Let Me

7-10

DATE 11-28-72

100

CABATI

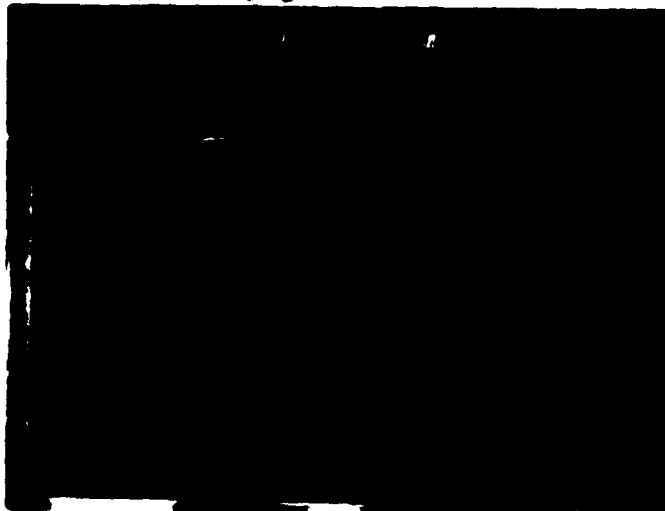
10

[illegible]

WOLFE: SUMMER NOT SLEEPER FOR THESE THIEVES

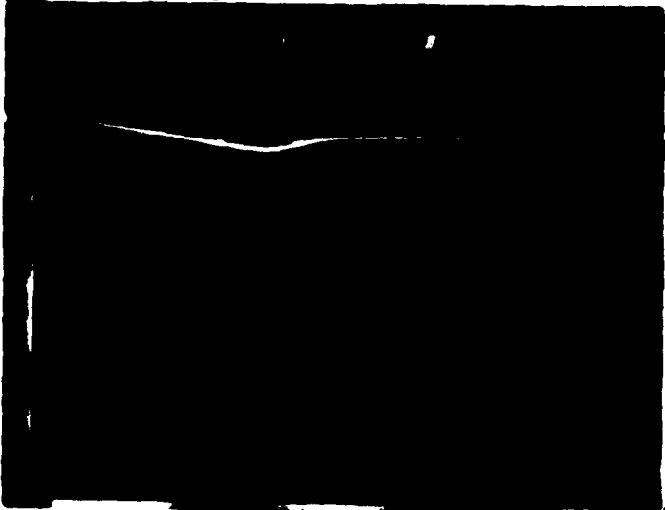
OWN THAT BUTLER (2004) 2004-04-04 10:00

UNCLASSIFIED - 7.3%



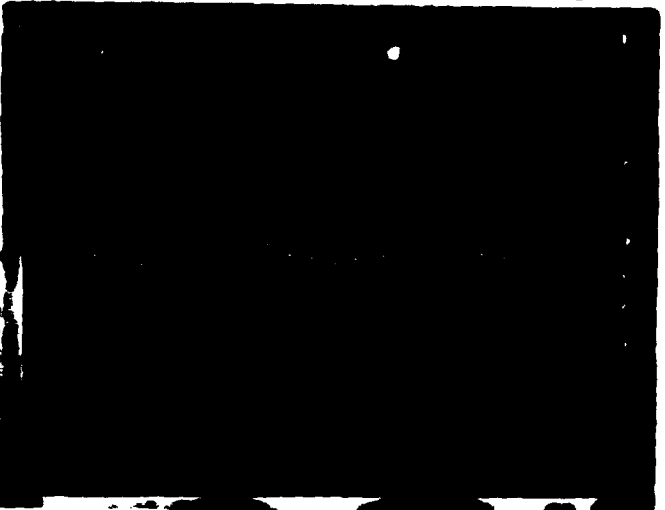
2.14ADL @ 540ADL @ 300VDC

UNCLASSIFIED - 7%



340ADL @ 2.14ADL @ 300VDC

300VDC IN 300VDC @ 2.14ADL AND



UNCLASSIFIED 50A/DIV



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION 1.5MV. PEEK

VI V @ 1.5MV
 VT 300VDC. MINIMUM
 WT AND CURRENT PEEK
 VT 2.14ADL TO 540ADL
 WT 300VDC IN
 WT 300VDC OUT

TEST NO. _____
 FILE NO. 11-28-1

VI V @ 1.5MV
 VT 300VDC. MINIMUM
 WT AND CURRENT PEEK
 VT 2.14ADL TO 3.14ADL
 WT 1.5MV IN

TEST NO. _____
 FILE NO. 11-28-2

VI 50A. TEST CURRENT
 WT 50A/DIV
 VT 1.5MV IN
 VT 300VDC @ 2.14ADL OUT
 WT 200 @ 48%

TEST NO. _____
 FILE NO. 11-28-3

120VAC 300VDC @ 4.70ADC LOAD

3.3% THD



INPUT CURRENT 50A/DIV

120VAC IN 300VDC @ 54ADC LOAD

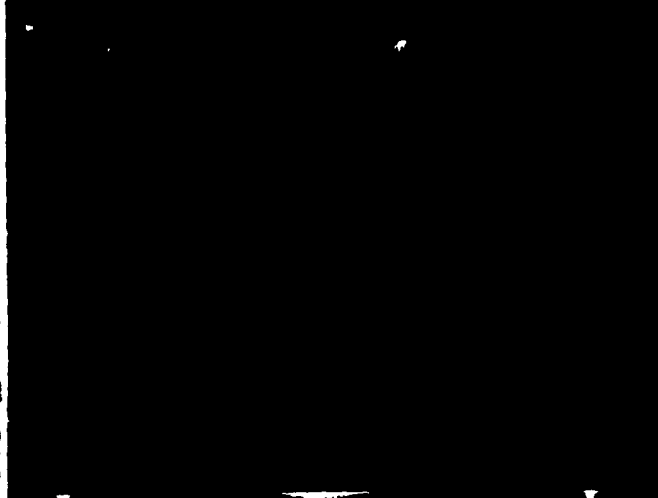
4.7% THD



INPUT CURRENT 50A/DIV

120VAC IN 300VDC @ 61.0ADC OUT

5.0% THD



INPUT CURRENT 50A/DIV



SANTA BARBARA, CALIFORNIA

TEST DESCRIPTION CONV. PERFE

VI 5A INPUT CURRENT

VE 50A/DIV

VS 120VAC IN

WT 300VDC @ 4.70ADC OUT

NT THD = 3.3%

NE

TEST NO.

PIX NO. 11-28-4

VI 5A INPUT CURRENT

VE 50A/DIV

VS 120VAC IN

WT 300VDC @ 54.0ADC OUT

NT THD = 4.7%

NE

TEST NO.

PIX NO. 11-28-5

VI 5A INPUT CURRENT

VE 50A/DIV

VS 120VAC IN

WT 300VDC @ 61.0ADC OUT

NT THD = 5.0%

NE

TEST NO.

PIX NO. 11-28-6

END

FILMED

10-84

DTIC